NORTHUMBERLAND SEA FISHERIES COMMITTEE.

REPORT on the Scientific Investigations

For the Year 1906, and to May 20th, 1909.

Edited by Professor ALEXANDER MEEK, M.Sc.,

[illegible] in the University of Durham; Superintendent of the Dove Marine Laboratory, Cullercoats, Northumberland.

Printed by order of the Committee.

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SEA FISHERIES COMMITTEE.

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For the Year 1908, and to May 20th, 1909.

EDITED BY PROFESSOR ALEXANDER MEEK, M.Sc.,

ARMSTRONG COLLEGE (IN THE UNIVERSITY OF DURHAM), NEWCASTLE-UPON-TYNE,

DIRECTOR OF THE DOVE MARINE LABORATORY, CULLERCOATS, NORTHUMBERLAND.

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CONTENTS.

SUMMARY AND GENERAL REPORT.

The trawling experiments were made during the autumn of 1908, and continued during the winter. The results are given in the Report to May 20th, 1909. The experiments of the previous season were made with a view to standardising the stations, and the results for 1908 confirmed the conclusion before arrived at, that the apparatus employed was sufficient in from one to two hours to indicate the condition of each station at the time of the experiment. It was also seen that the factor of greatest moment in producing variation was the state of the tide. It was therefore determined to make experimental hauls at the three southern stations during the winter, giving from one to two hours at each station. This is the first time that the stations have been visited in the winter season, and the results were found to be most striking. Of the dominant fish of the inshore bays a very small number of plaice are left in the winter, and the dabs practically desert the region altogether.

A synopsis of the surface and bottom life obtained at the trawling experiments is given, and of the pelagic fish eggs captured in April and May.

There were practically no fish marked at the trawling experiments during the past season, but interesting recaptures of fish marked in previous seasons are furnished. A turbot was caught after three years' and another after nearly four years absence. The majority of the flounders, as before, were sent back to us from the coast of Fife.

One hundred lobsters were marked at Beadnell, and thirty-eight at Sea Houses, at or about the end of the year 1907. Of the former thirty-six were recaptured in less than nine months, and of the latter three were recaptured in six months or less. None had migrated from the regions where the lobsters were caught and liberated.

A further consideration of the question of a close time for crabs during the season when a large percentage are soft or white, leads to the conclusion that the area would benefit, and the fishermen would benefit, if fishing for crabs was stopped during the period, viz., October 1st to December 31st.

Attention is drawn to the fact that the attempt on the part of the Sea Fisheries Committee to obtain complete statistics by including Alnmouth, Amble and Cresswell, has come to an end on account of the Board of Agriculture and Fisheries refusing to include these stations on its list.

Miss A. M. Carr, B.Sc., contributes two papers to this Report on the work she has been doing at the laboratory (1) on

the food of the fish caught at the trawling experiments, and of fish sent from North Shields, and (2) on determinations as to age of fish, based on an examination of otoliths and scales. The large quantity of material used in the first research serves to indicate very fully the nature of the food of several of the important fishes of the North-East Coast. The second paper is interesting also, referring as it does to fish not previously investigated in this manner.

An account is given of the new Marine Laboratory at Cullercoats, which was opened on September 29th, 1908, and to this Mr. Sisson has added a note on the condition of the sea water pumped into the Laboratory. An anonymous donor has kindly presented to the Laboratory a motor boat, which has been specially designed. It will be ready for work in August.

The Laboratory has been visited during the year by Professor Kofoid, of Berkeley University, California, and by Professor Mark, of Harvard University; and also by Dr. Bulstrode, of the Local Government Board, and by Mr. Archer and Dr. Masterman, of the Board of Agriculture and Fisheries.

I record here with regret the sudden death of W. H. Fudleston, M.A., F.R.S., which occurred at Warcham on Friday, January 29th, 1909.

ALEXANDER MEEK.

DOVE MARINE LABORATORY, CULLERCOATS.

TRAWLING EXPERIMENTS.

During the past season the "Livingstone" was employed for the trawling experiments. The "Livingstone" is the steamer which was used for the earlier fishery work in Northumberland, and it was therefore possible to make the trial hauls with the appliances and with the methods which have for so many years been used. The writer has again to thank the Fishery Officers and the Laboratory Attendant for the help given in making the hauls and measuring the fish.

In the last report it was pointed out that an attempt was made to standardise the stations by measuring the fish caught at a series of consecutive hauls. The results led to the conclusions (*a*) that the influence of the tide is demonstrated by the successive hauls, and (*b*) that even a short haul with a trawl having a given size of mouth (the conditions being met by a beam trawl) offered a fairly accurate quantitative and qualitative picture of each station at the time of the experiment.

To take the latter point first. On September 27th, 1907, at Skate Roads the yield per hour just before and after ebb for five hours trawling, as will be seen by reference to table III. of the present report, was remarkably constant. Again on September 9th, 1908, at the same station, when the tide was in a similar condition the same features were met with, the numbers of the species and the total catches varying only to a small degree. The other experiments which were made last season and this on the same lines showed also that trawling for from an hour to two hours was sufficient to illustrate the conditions of the station at that particular time.

They indicated also that at the inshore stations the factor of greatest importance in producing variation during a given day is the state of the tide. Most plaice are caught during the ebb and the early part of the flow. It is evident that they are captured as they retire from the shore with the retreat of the water. Dabs, too, increase in numbers during the ebb, and go on increasing during the flow. As in the case of the plaice, they are got in less numbers before and immediate after high tide. The same could be said of turbot and sole. The gurnard is mainly caught towards the end of the ebb, and again approaching and at high tide.

TABLE I.

Place.	Date.	Wind.	Sea.	Weather.	Temperature.		Condition of Ground.
					Air.	Sea.	
Blyth Bay ...	1908. Sept. 4th ...	N.E., strong	Rough	Cold, showery	.....	.....	First haul clean, subsequent hauls with a quantity of weed.
Skate Roads ...	,, 9th ...	W., changeable	Slight Swell	Unsettled	.....	.....	Weed at every haul.
Druridge Bay ...	,, 16th ...	S.S.W.	Smooth	Unsettled	60	54	Clean.
Blyth Bay ...	Oct. 8th ...	S.W.	Smooth	Fog	64	54	Clean.
Alnmouth Bay ...	,, 15th ..	S.E.	Smooth	Fine, fog	59	54	Clean.
Alnmouth Bay Druridge Bay Blyth Bay	Nov. 12th ...	W.S.W.	Smooth	Fine	54	49	Clean, or nearly so.
Alnmouth Bay Druridge Bay Blyth Bay	1909. Jan. 5th ...	S.W.	Smooth	Fine, dull	49	43·7	No weed at Alnmouth. Much weed, (*Laminaria*) at Druridge. Blyth clean
Druridge Bay Blyth Bay	Feb. 18th ...	S.W.	Smooth	Dull, fog	46·5	40·5	Weed at every haul.
Alnmouth Bay Druridge Bay Blyth Bay	April 8th ...	N.W.	Smooth	Fine, slight fog	51·5	44	Clean.
Alnmouth Bay Druridge Bay Blyth Bay	May 20th ...	S.E.	Slight swell	Fine	54	47·8	Clean at Alnmouth. Much weed at Druridge and at Blyth.

TABLE II.

1908

First Haul. BLYTH BAY, September 4th. Began 10·15 a.m., ended 11·45 a.m. Time, 1 hour 30 minutes. [Half ebb.]

CENTIMETRES.

Name of Fish	5	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	Total.
Plaice								3	3	3		1	1	3	4	10	3	3			1					1																			36
Dab										1	1	7	5	10	9	10	4	2	3	2	1		1	2			1																			59
Sole																								1																						1
Flounder																						1																									1
																																												97

Second Haul. BLYTH BAY, September 4th. Began 1·15 p.m., ended 2·45 p.m. Time, 1 hour 30 minutes. [End of ebb.]

Plaice								3	8		1	2	2	6	6	5	4	3	2		2			1	1																				46
Dab						1						3	5	2	5	1		2			1																									20
Sole																																	1	1											2
Cod														1				2																												3
																																													71

Third Haul. BLYTH BAY, September 4th. Began 2·55 p.m., ended 4·25 p.m. Time, 1 hour 30 minutes. [First half of flow.]

Plaice								1	4	2		2	2	3	4	6	6	2	1	1	1	1																								36
Dab											1	1	1	1	1		2		1																											9
Sole																									1																					4
Flounder																							1				1																		2
Cod		1											1				1																												4
Whiting			1	1																	1				1																			2
																																													57

TABLE II.—Continued.

1908.

First Haul. SKATE ROADS, September 9th. Began 6·35 a.m., ended 8·5 a.m. Time, 1 hour 30 minutes. [End of ebb.]

CENTIMETRES.

Name of Fish	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	53	Total.
Plaice	...	...	...	...	1	2	...	...	2	1	3	2	8	7	16	14	14	15	14	26	7	7	2	11	11	11	2	4	3	1	1	1	3	3	...	1	...	...	...	...	...	...	...	...	...	193
Dab	...	...	...	...	...	...	...	...	...	1	1	...	1	2	4	2	2	...	1	...	1	1	...	...	...	...	...	1	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	19
Brill	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Flounder	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	2	1	1	5	1	.	1	4	4	2	1	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	25
Gurnard	...	...	...	..	...	...	1	...	...	...	...	..	...	...	...	...	...	...	...	.	...	...	...	...	...	...	...	.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3
(2 damaged)																																														
Angler	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
																																														242

Second Haul. SKATE ROADS, September 9th. Began 8·35 a.m., ended 10·5 a.m. Time, 1 hour 30 minutes. [First half of flow.]

Plaice	...	...	...	2	...	...	2	...	4	7	2	6	11	9	8	10	22	22	13	17	22	9	9	11	6	7	5	6	3	2	3	3	1	...	...	1	...	...	...	..	...	...	...	...	..	...	223
Dab	...	...	1	..	..	...	...	..	...	...	1	3	4	1	2	...	1	...	1	...	1	...	1	1	2			1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	21
Flounder	...	...	...	..	...	...	.	...	...	...	...	...	...	...	1	1	...	...	1	...	...	3	.	2	...	1	3	...	1	2	...	...	...	2	1	...	...	...	1	...	...	...	...	...	...	19
Gurnard	...	...	...	...	.	...	...	...	.	2	1	1	5	8	3	7	3	...	3	...	...	...	...	...	..	1	.	...	...	...	...	...	...	...	...	.	.	...	...	...	...	...	...	...	...	34
Angler	...	.	...	.	...	...	..	...	.	...	...	..	...	...	...	...	...	3	1	...	...	1	2	.	2	..	...	.	...	...	.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9
Thornback	.	.	...	...	...	.		...	...	...	...	...	...	..	...	...	...	...	...	.	...	..	...	..	...	..	...	...	...	...	...	...	...	...	.	...	...	...	...	...	...	...	...	1	1	2
																																														308

Third Haul. SKATE ROADS, September 9th. Began 10·30 a.m., ended 12 noon. Time, 1 hour 30 minutes. [Second half of flow.]

Plaice	...	1	...	...	1	...	...	...	2	3	3	4	2	10	10	20	27	23	22	17	18	14	8	10	7	5	7	1	1	3	3	2	...	...	...	...	...	...	...	...	...	...	...	...	...	224
Dab	...	...	...	.	...	...	...	...	...	...	...	...	2	...	...	1	1	2	..	...	...	...	...	1	1	...	1	...	...	...	...	1	1	..	...	...	...	...	...	...	...	...	..	...	...	...	11
Turbot	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	2
Flounder	...	...	...	..	...	...	...	...	...	...	...	...	...	.	...	...	1	1	...	...	...	2	3	3	3	1	1	1	3	2	1	1	...	2	...	...	...	1	...	...	...	...	...	...	...	26
Angler	...	...	...	...	...	...	...	...	.	...	.	...	...	...	...	...	1	...	1	...	1	1	1	...	...	...	...	1	...	...	...	...	...	...	..	...	...	...	...	...	...	..	...	...	...	6
																																														269

1908.

First Haul. DRURIDGE BAY, September 16th. Began 10·15 a.m., ended 12·15 p.m. Time, 2 hour. [End of ebb.]

CENTIMETRES.

Name of Fish	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	53	59	Total.
Plaice	...	...	...	1	2	2	7	1	5	6	11	10	6	...	3	2	2	1	...	...	1	1	2	1	2	...	...	1	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	70
Dab	...	...	...	...	...	1	1	5	7	24	52	63	57	24	26	12	6	7	2	4	4	2	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	298
Sole	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	1	1	...	1	...	1	...	...	...	...	...	...	...	...	6
Turbot	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4
Cod	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Gurnard	...	...	...	...	...	1	1	2	3	4	4	3	4	3	2	6	8	5	5	3	3	...	3	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	63
Angler	...	...	...	...	...	...	...	.	...	...	...	...	...	...	...	1	2	1	...	3	...	...	...	...	...	1	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	10
																																														452

Second Haul (Beam broken during haul).

DRURIDGE BAY, September 16th. Began 12·25 p.m., ended 2·35 p.m. Time, 2 hours 10 minutes. [Low tide and first of flow.]

Plaice	...	...	...	...	...	...	...	...	1	...	...	2	1	1	2	1	1	1	1	...	1	2	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	1	17
Dab	...	...	...	...	1	...	...	...	2	5	18	8	7	7	1	5	...	5	...	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	61
Sole	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	3
Turbot	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Gurnard	...	...	..	...	5	1	2	2	2	4	3	...	...	1	...	1	1	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	24
Angler	...	..	...	...	...	...	...	...	...	1	1	...	1	2	1	2	...	1	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	12
																																														118

Third Haul. DRURIDGE BAY, September 16th. Began 3·10 p.m., ended 5 10 p.m. Time, 2 hours. [Half flow and second half of flow.]

Plaice	...	...	...	...	...	1	7	2	7	5	10	2	4	9	5	3	1	2	...	1	...	4	2	2	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	68
Dab	...	...	...	...	...	1	...	1	5	31	42	50	34	26	14	10	5	3	5	...	3	2	...	...	...	...	...	...	...	...	...	...	...	...	..	..	...	...	...	...	...	...	...	...	...	232
Sole	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	..	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	.	3
Turbot	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
Gurnard	...	...	2	5	12	5	6	2	4	7	12	10	3	3	3	2	1	3	3	4	2	3	1	1	...	...	...	2	...	1	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	99
Angler	...	...	...	...	...	...	...	...	1	...	...	1	...	1	1	1	3	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	10
																																														414

TABLE II.—CONTINUED.

(First Haul. Net was caught at the beginning (11·48 a.m.)—a large stone being the cause, which was raised and cleared. Another stone entered the net at the end of the Second Haul).

1908.

Second Haul. BLYTH BAY, October 8th. Began 3·10 p.m., ended 4·45 p.m. Time, 1 hour 35 minutes. [Half ebb.]

CENTIMETRES

Name of Fish	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	53	56	63	Total.
Plaice			1	2	4	5	9	7	2	1	8	5	6	4	7	3	3	1	1		2	1	3	2	3	4	2	1	1		1														89
Dab							2	3	7	4	6	6	6	4	1		3	1																											43
Sole																							1									1				1									3
Turbot																																										1			1
Flounder															1																														1
Gurnard				1	1			2	1	1		2	2	3	1			6		1	1	1																							23
Angler												2				1	1			2	1																								7
																																													167

Third Haul. BLYTH BAY, October 8th. Began 5·15 p.m., ended 5·45 p.m. Time, 30 minutes. [Second half of ebb.]

Name of Fish	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	53	56	63	Total.
Plaice					3	5	3	4	3	2	2	7	2	3		1			1		1				1			1																	39
Dab									1	2	4	2		1		1																													11
Sole																																			1										1
Flounder																						1																							1
Gurnard							2	1	1	1	2	1				1																													9
Angler																		1											1																2
																																													63

First Haul. ALNMOUTH BAY, October 15th. Began 10·45 a.m., ended 12·15 a.m. Time, 1 hour 30 minutes. [End of ebb.]

Name of Fish	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	53	56	63	Total.
Plaice				3	6	15	13	3	3	10	13	10	10	7	8	3	3		1		1		1		1	1																			112
Dab				1	1	1	1	1	1	2	3		4	1		1		2		3	2	3		1	1																				29
Sole																													2																2
Turbot																								1																					1
Flounder																		1																											1
Whiting											1																																		1
Gurnard				1		4	3	6	10	6	16	4	2	1	2	1	2	1			1		1			1																			62
Angler																																													

Second Haul. ALNMOUTH BAY, October 15th. Began 12·30 p.m., ended 2·30 p.m. Time, 2 hour. [First half of flow.]

CENTIMETRES.

Name of Fish	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	53	56	63	Total.
Plaice	...	...	...	2	25	32	17	2	3	9	14	9	7	4	7	1	1	...	...	2	...	1	...	1	2	1	1	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	144
Dab	...	...	...	1	1	2	2	3	8	12	7	10	5	...	...	1	3	1	1	...	1	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	60
Sole	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	2	...	...	...	1	...	...	...	...	...	...	...	4
Turbot	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.	...	...	...	1	...	1	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	.	...	...	...	4
Flounder	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	1	...	..	...	...	...	...	...	...	..	...	.	...	...	...	...	...	...	...	...	...	...	.	...	...	...	3
Gurnard	...	...	...	1	3	8	8	7	10	6	2	3	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.	.	..	...	50
Angler	...	...	...	...	...	...	...	...	1	...	...	...	...	1	1	1	2	2	2	1	2	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	15
																																														280

Third Haul. ALNMOUTH BAY, October 15th. Began 2·45 p.m., ended 3·45 p.m. Time, 1 hour. [Half flow.]

Plaice	...	..	...	...	2	7	12	8	2	3	1	5	7	6	4	2	2	...	...	...	...	...	...	1	...	...	...	...	..	...	..	..	...	...	...	...	...	...	..	.	...	.	...	..	..	62
Dab	...	...	...	...	1	1	1	4	3	13	12	13	3	3	4	3	...	1	3	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	66
Sole	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Flounder	...	..	...	...	.	...	..	...	..	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	1	...	..	...	...	..	..	...	..	...	1
Gurnard	...	...	...	...	2	5	5	5	5	2	5	2	1	1	...	...	...	...	1	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Angler	...	...	...	...	..	...	..	...	1	...	...	...	1	...	1	3	1	1	...	3	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	34
																																														12
																																														176

First Haul. ALNMOUTH BAY, November 12th. Began 10·45 a.m., ended 12·15 p.m. Time, 1 hour 30 minutes. [End of ebb.]

Plaice	...	.	.	...	...	..	1	1	...	2	2	2	...	8	7	3	3	4	1	..	4	1	...	1	..	..	..	...	...	.	...	..	...	...	...	...	...	...	...	...	..	..	...	...	...	40
Dab	...	...	...	..	.	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	.	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	2
Sole	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	.	...	1
																																														43

First Haul. DRURIDGE BAY, November 12th. Began 1·10 p.m., ended 2·40 p.m. Time, 1 hour 30 minutes. [Half flow.]

Plaice	...	...	...	...	...	...	2	1	2	...	...	1	1	3	1	3	1	1	..	...	3	...	1	...	2	...	1	3	1	...	1	..	...	1	...	...	...	...	...	..	...	...	...	...	...	29
Dab	...	...	...	...	...	..	...	...	...	...	...	...	...	1	..	...	...	.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Sole	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1
Turbot	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	1	...	...	...	1	...	...	...	.	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	2
Flounder	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
																																														34

TABLE II.—Continued.

1908.

First Haul (Beam broken). BLYTH BAY, November 12th. Began 3·50 p.m., ended 4·10 p.m. Time, 20 minutes. [Second half of flow.]

CENTIMETRES.

Name of Fish	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	53	56	63	Total.
Plaice	...	...	...	...	...	...	...	2	...	...	1	2	...	3	...	1	1	1	..	...	...	1	...	2	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	14
Dab	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Gurnard	...	...	..	..	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	.	...	...	...	...	...	...	...	...	...	..	...	..	...	...	1
																																														16

1909.

First Haul. ALNMOUTH BAY, January 5th. Began 11·40 a.m., ended 1·10 p.m. Time, 1 hour 30 minutes.

Plaice	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	3	2	..	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8
Sole	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Gurnard	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	..	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Thornback	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	2
																																														12

First Haul. DRURIDGE BAY, January 5th. Began 1·57 p.m., ended 3·27 p.m. Time 1 hour 30 minutes.

Plaice	...	...	...	1	1	...	1	1	...	...	...	1	...	...	...	2	2	...	1	1	...	1	...	.	1	1	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	14
Flounder	...	...	..	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	1	1	..	...	...	...	...	...	..	...	...	...	..	...	...	...	...	...	...	...	...	.	2
																																															16

First Haul. BLYTH BAY, January 5th. Began 4·35 p.m., ended 5·35 p.m. Time, 1 hour.

Plaice	...	...	...	...	...	1	1	...	...	...	1	2	...	3	1	2	1	2	...	1	...	1	1	1	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	21
Dab	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3
Flounder	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Cod	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	2	1	2	...	1	3	3	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	15
																																														40

TABLE II.—Continued.

First Haul. DRURIDGE BAY, February 18th. Began 2·35 p.m., ended 4·5 p.m. Time, 1 hour 30 minutes.

CENTIMETRES.

Name of Fish	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	53	56	63	Total.
Plaice	...	...	1	...	...	...	...	...	...	...	...	...	1	1	5	5	...	1	...	1	...	3	1	1	1	1	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	24
Dab	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
Flounder	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Cod	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Skate	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1
																																														29

First Haul. BLYTH BAY, February 18th. Began 5·25 p.m., ended 6·10 a.m. Time, 45 minutes.

Plaice	...	...	...	...	1	5	2	...	1	1	1	2	...	2	1	2	2	.	...	...	1	...	...	1	1	...	...	.	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	23
Cod	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	3
																																															26

First Haul. ALNMOUTH BAY, April 8th Began 10 40 a.m., ended 12·40 p.m. Time, 2 hours. [First of flow.]

Plaice	...	..	...	1	2	8	10	1	...	2	1	1	...	1	...	1	1	...	2	...	...	...	1	3	...	1	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	39
Sole	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1
Gurnard	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Thornback	...	.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
																																														42

First Haul DRURIDGE BAY, April 8th. Began 1·25 p m., ended 3 25 p m. Time, 2 hours. [Half flow]

Plaice	...	...	...	...	...	6	4	5	1	1	1	...	3	2	6	6	3	...	3	...	...	2	...	1	1	2	1	...	..	...	...	...	...	...	...	1	..	..	...	...	...	.	...	...	...	49
Dab	...	...	...	...	...	..	..	...	...	...	1	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3
Turbot	...	.	...	.	.	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1
																																														53

1909.

First Haul. BLYTH BAY, April 8th. Began 4·30 p.m., ended 5 45 p.m. Time, 1 hour 15 minutes. [End of flow]

CENTIMETRES.

Name of Fish	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	52	56	63	Total.
Plaice					4	4	5	1	1	1	2	3	2	3		3	4	..	1	1	1	1	3	2																							42
Flounder											1																																			1
																																												43

First Haul. ALNMOUTH BAY, May 20th. Began 12 noon, ended 1·30 p.m. Time, 1 hour 30 minutes. [Mid flow and after]

Plaice					1		3	5	2	1	4	5	5	8	4	4	3	3	2	2	1			1																					54
Dab											2		3	3	1			1																													10
Sole																																				1									1
Flounder													1				1																													2
Gurnard																								1				1																	2
Angler																					1																									1
																																												70

First Haul. DRURIDGE BAY, May 20th. Began 2·25 p.m, ended 3·55 p.m. Time, 1 hour 30 minutes. [End of flow]

Plaice					2		1	5		6	3	3	2	6	4	2	4	7	4	1		2			1	1	1		1																56
Dab									1				2							1																										4
Turbot																								1		1				1																3
Flounder																	1				1																									2
Gurnard											1				1						1		2	1				1	1																8
Angler																																					1	1							2
																																													75

First Haul. BLYTH BAY, May 20th. Began 5·19 p.m., ended 6·19 p.m. Time, 1 hour.

Plaice					1	2	4	3	10	1	2	3	1	1	3	2	2	4	4																										43
Dab								1	2						1	2																															6
Gurnard																								1																							1
																																													50

Year.	Date.	Turbot.	Brill.	Sole.	Plaice.	Dab.	Flounder.	Total Flat Fish.	Gurnard.	Cod.	Whiting.	Cole Fish.	Skate.	Angler.	Total.	Grand Total.
1906	June 20...	...	...	1·3	34·7	9·3	2·7	48	13·3	...	...	...	..	13·4	...	74·7
	July 25...	1·2	...	1·2	19·2	52·8	...	74·4	61·2	...	...	...	...	44·4	...	180
	Aug. 1...	1	1	1	64	18	8	93	16	...	...	...	...	35	...	144
	Sept. 12...	3	...	...	37	7	30	77	4	...	...	...	...	7	...	88
														...		
1907	Sept. 6...	3	...	...	53	38	...	94	18	...	...	...	...	...	...	112
	,,	·6	...	3·6	34·2	24	2·4	64·8	7·2	...	...	...	...	...	...	72
	,,	·6	...	1·3	24·6	17·1	3·2	46·8	7·6	...	...	...	...	1·2	...	55·6
	,,	·4	...	2·1	37·3	34·3	2·6	76·7	15·4	...	...	...	...	·9	...	93
	Mean ...	·9		2	35·8	28·1	2·3	69·1	11·9					·6		81·6
	Sept. 20..	·6	...	·6	52·6	21·7	12	87·5	22·2	...	...	...	...	·6	...	110·3
	,,	2·9	...	·1	11·9	8·4	4	30·6	4·1	...	...	...	...	·7	...	35·7
	,,	3·	...	1·8	38·1	33·6	8·4	85·2	12	...	...	...	...	1·8	...	99
	,,	·8	...	1·5	33	39	1·5	75·8	27·8	...	...	...	...	2·2	...	105·8
	Mean ...	2		1	32·1	22·5	6·5	64·1	14·3					1·2		79·6
1908	Sept. 4...	...	...	·7	24	39·3	·7	64·7	...	...	...	...	...	...	...	64·7
	,,	...	...	1·3	30·7	13·3	...	45·3	...	2	...	...	...	...	...	47·3
	,,	...	...	2·7	24	6	1·3	34	...	2·7	1·3	...		...	...	38
	Mean ...	...	...	1·5	26·2	19·6	·7	48	...	1·5	·5	...		...	...	50
	Oct. 8...	·6	...	1·9	56·2	27·2	·6	86·5	14·5	...	...	...	..	4·4	...	105·5
Mean	2 hauls ...	·5		2	64	27	1	94·5	16	...	...			4·5		115
1908	Nov. 12...	...	...	...	42	3	...	45	3	...	...	...	...	...	...	48
1909	Jan. 5...	...	...	...	21	3	1	25	...	15	...	...	...	...	...	40
	Feb. 18...	...	...	...	30·7	...	...	30·7	...	4	...	...	...	...	...	34·7
	April 8...	...	...	...	33·6	...	·8	34·2	...	...	...	...	...	...	...	34·2
	May 20...	...	....	...	43	6	...	49	1	...	...	...	...	...	...	50
					...	...	...	...	...	...						...

TABLE III.—Continued.—CAMBOIS BAY

Year.	Date.	Turbot.	Brill.	Sole.	Plaice.	Dab.	Flounder.	Total Flat Fish.	Gurnard.	Cod.	Whiting.		Thornback	Angler.	Total.	Grand Total.
1906	July 25...	1	...	3	11	129	...	144	273	...	...	...	...	12	...	429
	Sept. 5...	...	...	3	37	179	1	220	75	...	...	...	...	4	...	299
1907	Sept. 20...	...	...	4	16	96	...	116	4	...	...	...	...	4	...	124*
		...		...	...	...	...	...	...					...		...

* 15 mins. only (x 4).

ALNMOUTH BAY.

1906	July 18...	4	...	3	20	31	1	59	30	...	...	...	...	20	...	109
1907	Aug. 24...	...	...	1	42	42	5	90	13	...	...	...	...	7	...	110
1908	Oct. 15...	·7	...	1·3	74·7	19·3	·7	96·7	41·3	...	·7	...	...	4	...	142·7
	,,	2	...	2	72	30	1·5	107·5	25	...	...	...	...	7·5	...	140
	,,	...	...	1	62	66	1	130	34	...	...	...	...	12	...	176
	Mean ...	1·1	...	1·6	70·7	34·5	1·1	109	32·5	...	·2	...	...	7·3	...	149
	Nov. 12...	...	...	·3	27	·7	...	28	...	...	...	...	...	...	...	28
1909	Jan. 5...	...	...	·7	5·3	...	...	6	·7	...	...	...	1·3	..	...	8
	April 8...	...	...	·5	19·5	...	...	20	·5	...	...	...	·5	...	...	21
	May 20...	...	...	·7	36	6·7	1·3	44·7	1·3	...	...	...	...	·7	...	46·7
				...	...	...	. .	...	...					...		...

TABLE III.—CONTINUED.—DRUMRIDGE BAY

Year.	Date.	Turbot.	Brill.	Sole.	Plaice.	Dab.	Flounder.	Total Flat Fish.	Gurnard.	Cod.			Thornback Skate.	Angler.	Total.	Grand Total.
1906	July 4...	7	...	3	45	21	15	91	23	...	...	...	...	19	...	133
	Aug. 22...	...	...	2	19	225	3	249	29	...	...	...	...	22	...	300
	Sept. 5...	1·6	...	6·4	47·2	156·8	9·6	221·6	94·4	...	...	...	...	11·2	...	327·2
	Mean ...	...		...	...	...	...	...	...					...		
1907	Aug. 19...	2	...	7	29	51	...	89	87	...	...	...	...	1	...	177
	Sept. 4...	4	...	2	21	62	...	89	4	...	...	...	...	6	...	99
	Sept. 14...	2	...	2	37	41	...	82	79	...	...	...	...	6	...	167
	,,	1·3	...	3·3	26·7	73·3	...	104·6	20	...	...	...	...	9·4	...	134
	,,	·5	...	1	41	105·5	·5	151·5	192	...	...	...	...	4	...	347·5
	Mean ...	1·1		2	36·7	80·4	·2	120·1	109·6					6·2		236·2
1908	Sept. 16...	2	...	3	35	149	...	189	31·5	·5	...	...	...	5	...	226
	* ,,	1	...	1·5	31	116	...	152·5	49·5	...	...	...	...	5	...	207
	Mean ...	1·5		2·2	34·5	132·5	...	170·7	40·5	·3				5		216·5
1909	Nov. 12...	1·3	...	·7	19·3	·7	·7	22·7	...	...	...	...	...	...	...	22·7
	Jan. 5...	...	...	...	9·3	...	1·3	10·6	...	...	...	...	...	...	...	10·6
	Feb. 18...	...	..	...	16	1·3	·7	18	..	·6	...	...	·7	...	...	19·3
	April 8...	·5	...	...	24·5	1·5	...	26·5	...	...	...	...	...	...	...	26·5
	May 20...	2	...	...	37·3	2·7	1·3	43·3	5·3	...	...	...	...	1·4	...	50
		...		...	...	...	...	...	...	...	...			...		...

* One haul omitted.

TABLE III.—Continued.—SKATE ROADS.

Year.	Date.	Turbot.	Brill.	Sole.	Plaice.	Dab.	Flounder.	Total Flat Fish.	Gurnard.	Cod.			Thornback	Angler.	Total.	Grand Total.
1906	June 27...	1	...	...	58	5	3	67	...	...	...	...	...	2	...	69
	Aug. 6...	3	...	...	125	6	4	140	14	...	...	...	...	46	...	200
	„ 29...	1	...	...	260	1	29	291	16	...	...	...	...	4	...	311
1907	Aug. 29...	1	...	...	139	3	18	161	3	...	...	...	...	1	...	165
	„	3·2	...	·8	231·2	8·8	6·4	250·4	1·6	...	...	...	1·6	4·8	...	258·4
	„	...	...	...	85·2	3·6	8·4	97·2	2·4	...	...	...	...	...	...	99·6
	Mean ...	1·7		·3	166·3	5·7	11	185	2·3				·7	2·3		190·3
	Sept. 4...	5	...	...	102	14	18	139	2	...	...	...	2	1	...	144
	Sept. 27...	2	...	...	130	14	1	147	11	...	...	...	...	1	...	159
	„	2·5	...	...	126·5	9·5	8·5	147	·5	...	..	...	...	6	...	153·5
	„	2	...	...	126	9	3	140	3	...	...	...	...	2·5	...	145·5
	Mean ...	2·2			127	10·2	4·8	144·2	3·6				...	3·6		151·4
1908	Sept. 9...	...	·6	...	128·7	12·7	16·7	158·7	2	...	...	...	...	·6	...	161·3
	„	...	...	...	148·7	14	12·6	175·3	22·7	...	...	...	1·3	6	...	205·3
	„	1·3	...	...	149·3	7·4	17·3	175·3	...	...	...	...	...	4	...	179·3
	Mean ...	·5	·2		142·2	11·3	15·6	169·8	8·2				·4	3·6		182

TABLE IV.

Catch per one hour's trawling.

PLAICE.

Stations.	Jan. 5.	Feb. 18.	Apl. 8.	May 20.	June.	July.	Aug.	Sept.	Oct.	Nov. 12.
Blyth Bay	21·0	30·7	33·6	43·0	24·0	43·0	61·0	67·0	64·0	42·0
Druridge Bay.....	9·3	16·0	24·5	37·3	48·0	36·0	50·0	41·0	—	19·3
Alnmouth Bay ...	5·3	—	19·5	36·0	54·0	37·0	64·0	58·0	70·7	27·0

DAB.

Blyth Bay	3·0	—	—	6·0	18·0	39·0	73·0	39·0	27·0	3·0
Druridge Bay.....	—	1·3	1·5	2·7	22·0	43·0	92·0	68·0	—	0·7
Alnmouth Bay ...	—	—	—	6·7	33·0	49·0	68·0	35·0	34·5	0·7

FLOUNDER.

Blyth Bay	1·0	—	0·8	—	2·2	6·0	5·2	7·5	1·0	—
Druridge Bay.....	1·3	0·7	—	1·3	1·0	2·6	1·0	1·3	—	0·7
Alnmouth Bay ...	—	—	—	1·3	15·0	9·0	14·0	2·2	1·1	—

GURNARD.

Blyth Bay	—	—	—	1·0	7·0	14·0	21·0	14·0	16·0	3·0
Druridge Bay.....	—	—	—	5·3	14·0	18·0	39·0	40·0	—	—
Alnmouth Bay ...	0·7	—	0·5	1·3	29·0	60·0	4·4	8·5	32·5	—

ANGLER.

Blyth Bay	—	—	—	—	6·7	10·0	20·0	2·7	4·5	—
Druridge Bay.....	—	—	—	1·4	2·0	4·5	5·0	4·4	—	—
Alnmouth Bay ...	—	—	—	0·7	3·4	6·0	8·0	—	7·3	—

TABLE V.

Total Catches of Plaice at each Station.

Centimetres.	1907.					1908.								1909.							
	Skate Roads, Aug. 29th.	Blyth Bay, Sept. 6th.	Druridge Bay, Sept. 14th.	Blyth Bay, Sept. 20th.	Skate Roads, Sept. 27th.	Blyth Bay, Sept. 4th.	Skate Roads, Sept. 9th.	Druridge Bay, Sept. 16th.	Blyth Bay, Oct. 8th.	Almouth Bay, Oct. 15th.	Almouth Bay, Nov. 12th.	Druridge Bay, Nov. 12th.	Blyth Bay, Nov. 12th.	Almouth Bay, Jan. 5th.	Druridge Bay, Jan. 5th.	Blyth Bay, Jan. 5th.	Druridge Bay, Feb. 18th.	Blyth Bay, Feb. 18th.	Almouth Bay, April 8th.	Druridge Bay, April 8th.	Blyth Bay, April 8th.	Almouth Bay, May 20th.
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	.	1	..	1	...	...	2	1	1	...	...	...	...	...	1	...	1	...	1	...	...	...	...
13	..	6	2	5	1	1	2	2	2	7	...	...	...	...	1	...	...	1	2	...	...	...	...
14	2	25	20	20	15	10	...	3	7	38	...	...	...	...	1	...	...	5	8	6	4	1	...
15	7	18	31	24	52	13	8	14	10	59	1	2	...	...	1	1	...	2	10	4	4	...	...
16	5	9	23	19	69	3	11	3	12	38	1	1	2	1	1	...	...	...	1	5	5	3	...
17	4	6	6	1	45	3	8	13	11	7	...	2	...	...	...	...	...	1	...	1	1	5	1
18	8	2	2	7	29	5	12	11	5	9	2	...	...	...	...	...	...	1	2	1	1	2	...
19	10	2	2	3	27	6	21	21	3	20	2	...	1	...	...	1	...	1	1	1	1	1	...
20	4	14	4	13	24	13	26	14	10	32	2	1	2	...	1	2	...	2	1	...	2	4	...
21	15	12	5	7	13	16	34	11	12	26	...	1	...	...	...	...	...	...	...	3	3	5	1
22	25	12	9	12	12	21	44	10	8	23	8	3	3	...	...	3	1	2	1	2	2	5	1
23	46	13	5	10	12	9	63	10	7	15	7	1	...	...	...	1	1	1	...	6	3	8	3
24	71	7	15	9	23	7	60	6	7	17	3	3	1	...	2	2	5	2	1	6	...	4	2
25	51	15	2	10	23	3	49	4	4	6	3	1	1	3	2	1	5	2	1	3	3	4	1
26	32	12	5	10	34	1	60	4	3	4	4	1	1	2	...	2	...	...	...	...	4	3	4
27	36	13	11	5	31	4	47	1	1	...	1	...	...	...	1	...	1	...	2	3	...	3	1
28	29	19	6	9	25	...	30	1	2	1	...	...	...	...	1	1	...	...	...	...	1	2	...
29	28	10	9	23	21	...	19	2	...	2	4	3	.	...	...	...	1	1	...	...	1	2	...
30	45	12	3	12	25	1	32	7	3	1	1	...	1	...	1	1	...	...	...	2	1	1	...
31	26	10	2	6	30	1	24	4	1	1	...	1	...	...	...	1	3	...	1	...	1	...	...
32	13	4	...	14	32	1	23	3	3	2	1	...	2	1	...	1	1	1	3	1	3	...	...
33	21	4	...	9	24	...	14	3	2	1	...	2	...	1	1	...	1	1	...	1	2	1	...
34	11	6	1	8	21	...	11	...	4	3	...	...	...	...	1	3	1	...	1	2	...	...	...
35	3	..	2	1	17	...	7	...	4	2	...	1	...	...	...	...	1	..	1	1	...	...	...
36	1	1	...	...	11	..	6	2	2	1	..	3	...	...	...	...	...	...	1	...	...	...	...
37	3	...	...	1	8	...	7	3	2	1	...	1	...	...	...	...	2	...	1	...	...	...	...
38	1	...	...	...	3	...	6	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...
39	1	2	...	...	2	...	4	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	1	2	...	3	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	1	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...
44	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...
46	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
47	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
48	...	...	..	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
49	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
51	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
52	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
53	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
54	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
55	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
56	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
57	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
58	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
59	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
60	...	...	..	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
61	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
62	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
63	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

TABLE VI.

Total Catches of Dabs at each Station.

1907.					1908.							1909.									
Skate Roads, Aug. 29th.	Blyth Bay, Sept. 6th.	Druridge Bay, Sept. 14th.	Blyth Bay, Sept 20th.	Skate Roads, Sept. 27th.	Blyth Bay, Sept. 4th.	Skate Roads, Sept. 9th.	Druridge Bay, Sept. 16th.	Blyth Bay, Oct. 8th.	Alnmouth Bay, Oct. 15th.	Alnmouth Bay, Nov. 12th.	Druridge Bay, Nov. 12th.	Blyth Bay, Nov. 12th.	*Alnmouth Bay, Jan. 5th.	*Druridge Bay, Jan. 5th.	Blyth Bay, Jan. 5th.	Druridge Bay, Feb. 18th.	*Blyth Bay, Feb. 18th.	*Alnmouth Bay, April 8th.	Druridge Bay, April 8th.	*Blyth Bay, April 8th.	Alnmouth Bay, May 20th.	Druridge Bay, May 20th.	Blyth Bay, May 20th.
...	1	...		...	...	1	...	...	...	...	..	..	...	...	...	...	...	..	..	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...		...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	..	...	...	...	...	...	..	...	...	...	..	.	...	...	...	...	...	...	...	...	...
...	...	1	1	...	1	...	...	...	...	...	..	..	..	.	...	...	...	...	...	...	...	...	...
...	..	...	1	...	...	...	1	...	3	...	...	...	..	..	...	...	...	...	...	...	...	...	...
..	..	1	2	..	...	...	2	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...
..	...	2	..	...		...	1	...	4	...	.	...	...	...	...	...	..	...	...	..	...	...	...	...
...	1	5	3	...	2	1	6	2	7	...	..	...	...	...	...	...	...	...	...	...	...	...	1
...	3	10	3	2	2	2	14	3	7	1	...	...	...	...	..	..	..	..	...	...	...	1	2
.	12	28	17	1	11	3	60	8	22	...	...	...	...	...	...	...	...	...	...	...	...	...	...
..	17	49	18	..	11	7	112	6	26	...	..	...	..	..	.	...	..	...	1	...	...	...	...
..	32	71	25	2	13	3	121	10	23	...	..	..	...	.	...	...	...	...	...	...	2	...	...
2	31	63	16	.	14	6	98	8	13	...	..	...	..	...	...	...	...	...	...	...	...	2	...
..	23	38	30	5	13	3	57	6	12	...	1	...	...	...	...	...	...	...	1	...	3	...	...
2	14	29	9	4	4	4	41	5	5	...	...	...	...	...	..	..	..	...	...	...	3	...	1
.	14	16	15	3	5	2	27	1	3	...	...	...	...	...	...	1	...	..	...	..	1	...	2
1	7	20	8	3	3	2	11	1	2	...	...	1	...	...	...	...	...	...	...	...	...	.	..
..	8	12	10	...	2	...	15	3	4	...	...	...	...	...	...	...	...	.	...	...	...	...	...
2	6	7	7	4	2	2	7	1	6	...	...	...	...	...	...	...	...	...	...	...	1	...	...
	6	6	6	2	...	1	4	...	1	...	...	...	...	...	1	...	...	...	...	...	...	1	...
.	4	1	2	5	1	1	8	...	4	...	...	...	...	...	...	1	...	...	1	...	..	...	...
1	...	1	1	2	2	2	4	...	3	1	...	..	...	...	...	...	...	...	...	...	...	...	...
2	2	1	1	2	...	3	...	..	3	...	...	...	...	...	1	...	...	..	...	..	...	..	..
2	...	...	...	5	...	...	1	...	...	...	...	...	...	...	1	...	..	...	...	..	..	..	...
2	2	...	...	2	2	1	1	...	3	..	.	...	...	...	.	...	...	...	...	.	...	...	..
.	2	...	...	3	...	2	...	...	1	...	...	...	...	...	...	...	...	...	...	..	..	..	...
	...	1		2	...	1	...	...	..	...	...	...	...	...	...	...	...	..	..	..	...	...	...
	...	...	...	2	...	..	...	...	...	...	...	...	...	...	...	...	..	...	...	..	..	..	...
	...	...	...	2		...	...		...	...	...	...	...	..	...	...	...	..	...	..	...	..	...
	...	...	...	...	...	2	...	...	...	...	...	...	...	...	..	...	...	...	..	...	...	..	...
	...	...	...	..	.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	..	..	..	...
	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

* No Dabs caught.

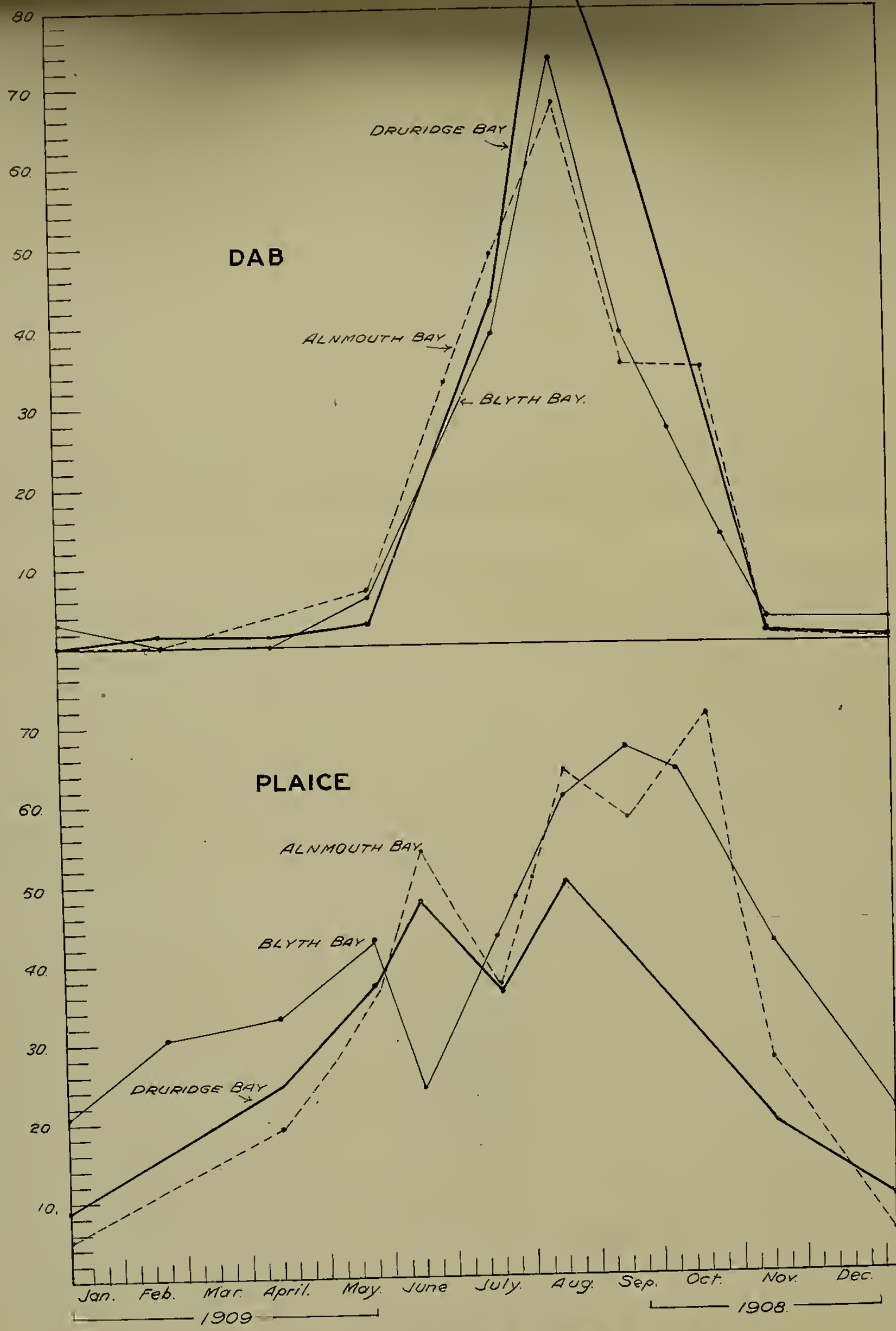
The experiments have always been made along lines paralle the shore and the net is therefore drawn across the fish which migrating outwards or inwards according to the state of the t These tidal migrations are indicated in the tables accompany this and the preceding reports.

The previous experiments and those made in the autumn of l year made it plain therefore that the conditions of the statio could be shown by a shorter period of trawling, alway rememberi the influence of the tide. It has thus been possible on a single d during the winter months to add observations with regard to thr of the southern stations, Alnmouth Bay, Druridge Bay and Bly Bay.

This has brought the experiments into the present year, and th results are presented to May 20th. As before, the general condition are set forth in Table I., and a complete statement as to the catche in Table II. The figures have been brought together in Table III in terms of catch per one hour's trawling.

The results obtained during the winter 1908-9, when conjoined with those before obtained for the summer may be used to picture the conditions of the stations with regard to fish during the year. In the following table (Table IV.), the figures for June, July August and September are the mean results for each of these months for the years 1899 to 1908. For the other months the figures are those above mentioned. The table—see also chart I.—shows very clearly that the inshore waters are liable to a summer increase and a winter decrease, or in other words that there is a conspicuous seasonable inshore and offshore migration of the species. With regard to plaice there is evidence to show moreover that there is a spring maximum about May-June, and an autumn —the greater—from August to September or October. Dabs practically desert the regions in which the experiments have been conducted during the winter; they begin to increase markedly in numbers in June, reach a maximum in August, and sink again rapidly during September and October to the winter condition. The few flounders caught exhibit pretty much the same features as the plaice. Gurnards are so far as the stations are concerned summer fish also, and possibly also are subject to an autumn maximum. The anglers likewise reach a maximum about August.

Plaice.—Table V. shows that the trawl net used at the experiment catches during the summer, plaice from 12 cm. to 40 cm. ($4\frac{1}{2}$ to $15\frac{1}{2}$ in.), and that it is only rarely that larger plaice are captured so near



CATCH PER ONE HOUR'S TRAWLING.

CHART I.

to the shore even at that season. It shows also that the plaice caught during the winter months are a sort of relic of this summer population, the same kind of plaice are represented in very much reduced numbers.

These plaice are from two to five years old. It is plain, therefore, that the bays of the Northumberland coast support in the summer a large population of plaice from recently hatched to nearly mature in size and age; and that this population suffers a great regression during the winter, indeed for rather more than half the year. At the beginning of this latter season, the plaice migrate into deeper water, and to a large extent outside the Committee's district, returning again in the spring.

The figures in Table V. indicate, moreover, that the small two-year old plaice congregate in large numbers in the region of the stations in September and October, and immediately thereafter disappear—compare Skate Roads, August 29th, and September 27th, 1907, and Ahmouth Bay, October 15th and November 12th, 1908. The previous experiments have shown that the same class and the two-year old fish of the season return about June.

There is another point which it is important to note with reference to the migration in relation to tide. The successive catches at different phases of the tide may in the total be closely similar, and at the same time differ markedly as to the numbers in relation to size. For example, at Skate Roads on September 27th, 1907, when the catch per hour was almost exactly the same for five hours, the two-year old plaice were got most conspicuously at the first and at the third haul; the second haul presented the most larger and older fish. The first haul was made at mid-ebb, the second at the end of the ebb, and the third during the early part of the flow.

Dab.—In table VI., the catches of dabs at the same places and for the same time in each case are brought together. A comparison between this table and Table V. serves again to illustrate the difference between the northern and the southern stations with regard to the proportional numbers of the two species. The table shows that the dabs caught in the summer have a range of size which is very similar to that presented by the plaice, only, as would naturally be expected, they tail off rapidly in numbers above 30 cm., and it is seldom that a size of 40 cm. is reached. A very small remnant of this population of summer dabs is left in the region of the stations during the winter.

The dabs caught are from two to eight years old, the majority being three to five years fish. They come into the inshore regions, especially in the southern part of the Northumberland area, every season about May to June, increasing in numbers to August and September, when they begin to migrate for the winter to the deeper water, and to a large extent just outside the district. They were, in November, for example, caught by the trawlers in plenty in about 33 fathoms off St. Mary's Island.

SURFACE AND BOTTOM LIFE OBTAINED AT THE TRAWLING EXPERIMENTS.

In Table VII. the plankton and the forms other than edible fish obtained in the trawl are presented. It has not been attempted to do more than indicate in a qualitative manner the nature of both.

The most interesting feature of the plankton of October to January was the presence in vast numbers of *Tima bairdii*. The Medusoid appeared in the waters off the Northumberland coast about October, and was observed at different localities from Holy Island to Cullercoats. At the trawling experiments, it was got not merely in the surface net, but entangled also sometimes in large numbers in the meshes of the trawl. It disappeared in January. During the same period the Amphipods, *Euthemisto compressa* and *Metopa alderi* were also very common at the surface; the latter disappearing in January, the former still being represented in April and May. It is interesting to note again the occurrence of numbers of soft crabs in the region of the trawling stations in September and October.

The floating eggs of fish were captured in the surface net in April and May. They have not preserved to advantage, and consequently only suggestions are made as to the species.

TABLE VII.—SURFACE AND BOTTOM LIFE.

1908. September 4. Trawl. Blyth Bay.	Soft edible crabs, an old female crab, and several undersized crabs, *Portunus holsatus*, *Idotea balthica*, *Eupagurus bernhardus*, *Crangon vulgaris*, Cyanea.
September 9. Trawl. Skate Roads.	Lobster, female 9½ inches. Many soft edible crabs, an old female crab, *Carcinus maenas*, *Eupagurus bernhardus*, *Portunus holsatus*.
September 16. Trawl. Druridge Bay.	Soft edible crabs, *Portunus holsatus*, *Cyprina islandica*, Cyanea, Aurelia, Pelagia.

TABLE VII.—Continued.

October 8. Trawl. Blyth Bay.	*Portunus holsatus.*
October 15 Surface Net. Alnmouth Bay.	*Tima bairdii*, many, Pleurobrachia, numerous, *Metopa alder* xx, *Euthemisto compressa*, x, Megalopa.
Trawl.	Soft edible crabs, *Carcinus maenas*, *Portunus holsatus*, *Tim bairdii* attached to trawl net in large numbers.
November 12. Surface Net. Alnmouth Bay.	*Tima bairdii*, undetermined medusoids, Pleurobrachia, *Metop alderi*, xx, *Euthemisto compressa*, xxx, Zoea, Copepoda.
Trawl.	*Portunus holsatus*, *Tima bairdii*, very numerous.
November 12. Surface Net. Druridge Bay.	*Metopa alderi*, xx, *Euthemisto compressa*, xxx, *Eurydic achatus*, Megalopa, Pleurobrachia.
Trawl.	*Portunus holsatus*, *Tima bairdii*, numerous.
1909. January 5. Surface Net. Alnmouth Bay.	Medusoids. *Hyperoche tauriformis*, *Euthemisto compressa* xxx, *Paratylus swammerdami*, xx, *Metopa alderi*, jv., Copepoda, Sagitta.
Trawl.	*Tima bairdii*, now much less numerous.
January 5. Surface Net. Druridge Bay.	Medusoids, *Metopa alderi*, *Euthemisto compressa*, xxx, one northern size, rest small as usual, *Paratylus swammerdami*, Sagitta.
January 5. Surface Net. Blyth Bay.	*Schistomysis spiritus*, *Euthemisto compressa*, xxx, one northern size, some rather smaller, rest as usual, *Paratylus swammerdami*, x, *Metopa alderi* xx, *Synchelidium brevicarpum*, Sagitta, xxx.
February 18. Surface Net. Druridge Bay.	*Euthemisto compressa*, xxx, *Paratylus swammerdami*, Copepoda.
Trawl.	*Gobius minutus*, 58 mm., 5 sprats, 38 to 45 mm., herring, 56 mm., *Amathilla homari*, *Gammarus locusta*, *Paratylus swammerdami*, *Tima bairdi*, one specimen.

TABLE VII.—Continued.

February 18. Surface Net. Blyth Bay.	*Euthemisto compressa*, Sagitta.
April 8. Surface Net. Alnmouth Bay.	Fish ova: ·63 mm., no oil globule, xx. Dab? ·62 mm., oil globule, xx. Rockling? 1·54 mm., no oil globule, 2. Long Rough Dab? *Idotea balthica*, Copepoda.
Trawl.	*Solen siliqua.*
April 8. Surface Net. Druridge Bay.	Fish ova: ·63 mm., on oil globule, xxx. Dab? ·62 mm., oil globule, xx. Rockling? 1·24 mm., no oil globule. Whiting? 1·6 mm., no oil globule. Long Rough Dab? Zoeæ, xxx, Copepoda.
April 8. Surface Net. Blyth Bay.	Fish ova: ·63 mm., oil globule. Rockling? ·77 mm., no oil globule. Dab? ·98 mm., no oil globule. Flounder? *Paratylus swammerdami*, *Euthemisto compressa*, Nauplii, Zoeæ, Copepoda.
May 20. Trawl. Alnmouth Bay.	*Solen siliqua*, *Hyas coaretatus*, Flustra.
May 20. Surface Net. Druridge Bay.	*Amathilla angulosa*, Cirriped nauplii and Cypris stages, Zoeæ, Copepoda.
May 20. Surface Net. Blyth Bay.	Fish ova: ·66 mm., no oil globule. Dab? ·83 mm., oil globule. Topknot? ·99 mm., no oil globule. Flounder? 1·39 mm., oil globule. Brill? *Euthemisto compressa*, 2 Crangon, jv., Barnacle nauplii and Cypris stages, Zoeæ, Copepoda, Appendicularia.

MIGRATIONS OF INSHORE FLAT FISH.

During the past season, owing to the short visits paid to the stations, the work of marking fish was temporarily suspended. Two turbot measuring 21 cm. and 22 cm. were liberated at Druridge Bay on September 16th, 1908 (Nos. N. 301, 303).

In table VIII. some further interesting recaptures of fish marked in 1905, 1906, and 1907 are recorded. Most remarkable are the two turbot, both liberated in 1905, and recaptured one last year and the other this year, after an absence of nearly three and four years respectively. The former was found 110 miles east by north of the place of liberation, and the latter 75 miles south.

The increment of growth of the former was 13·9 cm. ($5\frac{1}{2}$ in.), and of the latter, 21 cm. ($8\frac{1}{4}$ in.). From the consideration of the growth of this species in the report for 1905, page 62, it may be concluded that the 27 mm. fish was three years old when it was marked, and increased during the three years it was at liberty to 40·9 cm. when it was just six years old. The curve between these points lies parallel to the curve already determined, and the size given may therefore be assumed to state the measurement of a male turbot of that age. The other specimen at 31 cm. was four years old and after nearly four years of liberty was 52 cm. at eight years of age. This was a female, and the rate of growth is greater therefore for the female. The records materially add to the conclusion which has for some time been apparent that the large specimens of the common food fish are by no means young.

Many of the recaptured flounders recorded here were again sent from the coast of Fife. One, however, a female, was caught off Hartlepool, as far to the south of the place of liberation as Fife is to the north. In 1906 a male was obtained off the Yorkshire coast, and thus the general northerly migration of this species is not without exception.

A flounder was reported to have been captured at Holy Island about May 3rd, 1908, but the fish and the label were lost. Another flounder, which was returned without the numbered part of the label, was a female measuring 29 cm. and was caught on Blyth Sands 26th June, 1908.

For the records of the recaptures acknowledgments are again heartily tendered to fishermen, and especially to the Directors of the Lowestoft and the Dundee Fisheries Laboratories.

Number	Date.	Length.	Where Liberated.	Where Captured.	Date.	Length.	Increase.	Sex.	Migration.
	1905.	Cm.			1908.	Cm.	Cm.		
1378	Aug. 2	27	Druridge Bay ...	55·39 N. 1·41 E. 37 fths. ... T.	May 20	40·9	13·9 in 1022 days	m	110 miles E. by N.
					1909.				
1356	,,	31	,, ..	20 miles N.E. by N. of Flamborough, 39 fs. T.	April 2	52	21·0 in 1339 ,,	f	mature. 75 miles S.

FLOUNDER.

Number	Date.	Length.	Where Liberated.	Where Captured.	Date.	Length.	Increase.	Sex.	Migration.
	1906.	Cm.			1908.	Cm.	Cm.		
9686	Aug. 29	35	Skate Roads ...	Off Anstruther in 9 fths.	April 2	?	? in 582 days	?	(Label only) 45 miles N.N.W.
	1907.								
3	Aug. 24	25	Alnmouth Bay ...	Alnmouth Bay	June 12	25·5	·5 in 293 ,,	m	Immature o
11	,, 24	20	,, ..	,, ... N.	May 15	21	1 in 265 ,,	f	,, o
42	,, 29	25	Skate Roads ...	Between Kinghorn and Kirkaldy in 10 fths. ...	April 13	28	3 in 228 ,,	m	Mature. 55 miles N.N.W.
50	,, 29	29	Caught Skate Rds. Liberated between Farnes & Holy Id.	St. Andrews Bay L.	Mar. 23	29·6	·6 in 207 ,,	m	55 miles N.N.W.
64	Sept. 4	31·5	Skate Roads ...	1 mile from Elie Ness, Firth of Forth, 13 fths.	April 10	32	·5 in 219 ,,	f	Mature (on eve of spawning). 45 miles N.N.W.
111	,, 6	22	Blyth Bay	Blyth Harbour	Sept. 24	22	0 in 348 ,,	f	Immature. Say a mile N.
113	,, 14	24	Caught Druridge B. Liberated off Blyth	3 miles N.E. St. Andrews in 8 fths. ... F.N.	April 4	24*	0 in 204 ,,	m	Mature. 55 miles N.N.W.
131	,, 20	23	Blyth Bay	Blyth Bay ... N.	July 7	24·7	1·7 in 291 ,,	f	Immature.
136	,, 20	21·2	,, ..	Mouth of Tyne ... L.	June 26	?	? in 280 ,,	?	8 miles S.
141	,, 20	21·5	,, ...	Blyth Bay ... N.	,, 13	22·4	·9 in 267 ,,	m	Immature. o
170	,, 20	27	,, ..	,, ... N.	July 28	30	3 in 312 ,,	f	,, o
187	,, 27	27·2	Skate Roads ...	Goswick Bay ... N.	May 30	27·5	·3 in 253 ,,	f	Spawned. 5 miles N.
196	,, 27	30	,, ..	17 miles E. by N. Hartlepool in 13 fths.	April 17	30·4	·4 in 210 ,,	f	Spent. 60 miles S.

* Received in a dry, shrivelled-up condition.

MIGRATIONS OF LOBSTERS.

Arrangements were made with John Douglas, Beadnell, and George Fawcus, Sea Houses, for the marking and liberating of a series of lobsters in the latter part of 1907. The results of the experiment are given in table 9.

TABLE IX.—MIGRATIONS OF LOBSTERS.

BEADNELL, 1907.

Number.	Date.	Sex.	Date and Place of Recapture.
	1907.		1908.
201	October 10th ...	m	
202	,, 30th ...	m	
203	.....	f	
204	.....	f	
205	.....	m	
206	.....	m	June 18th, inshore.
207	.....	f	
208	.....	m	February 12th, 4 miles E.
209	November 11th ...	m	
210	.....	m	June 23rd, inshore.
211	... ..	m	,, 25th ,,
212	...	f	
213	November 13th ...	m	
214	.....	m	
215	.....	m	January 25th, in 5 fths. 1 mile S.
216	. ...	m	May 7th, inshore.
217	.....	f	
218	.....	m	
219	.....	f	
220	.....	f	
221	.....	f	(Berried).
222	.....	f	
223	November 14th ...	m	
224	,, 19th ...	f	
225	,, 20th ..	m	
226	.. ...	m	June 20th, inshore.
227	.....	m	May 21st, ,,
228	.....	f	(Berried) Mar. 28th, ½ mile E., hatched.
229	.....	m	
230	.....	f	May 7th, inshore.
231	.....	m	
232	November 21st ...	m	,, 18th ,,
233	.....	m	
234	...	m	
235	.....	f	,, 25th ,,
236	.....	f	,, 12th ,,
237	.....	f	February 15th, 2 miles E.
238	November 23rd ...	m	
239	... ..	m	
240	.....	m	
241	.....	m	
242	.....	m	
243	.....	m	
244	November 27th ...	m	
245	,, 28th ...	f	

TABLE IX. CONTINUED.—MIGRATIONS OF LOBSTERS.

Number.	Date.	Sex.	Date and Place of Recapture.
	1907.		1908.
246	November 28th ...	m	
247	December 3rd ...	m	
248	,, 4th ...	m	
249	.....	m	
250	.....	f	May 7th, inshore.
251	.....	f	
252	.....	m	
253	.....	m	,, 14th ,,
254	.....	m	
255	.....	m	
256	.....	f	
257	.....	m	
258	.....	f	,, 26th ,,
259	.....	m	,, 8th ,,
260	.....	m	
261	December 7th ...	f	June 25th ,,
262	.....	f	May 7th ,,
263	.....	m	
264	.....	f	
265	.....	m	
266	.....	m	
267	.....	m	May 7th, inshore.
268	.....	f	
269	.....	m	
270	.....	f	,, 7th ,,
271	.....	m	,, 13th ,,
272	.....	m	,, 25th ,,
273	.....	m	,, 6th, 1 mile E.
274	.....	m	
275	.....	m	
276	.....	m	,, 26th inshore.
277	December 9th ...	m	,, 18th ,,
278	.....	m	
279	...	f	,, 21st ,,
280	December 10th ...	f	
281	.....	f	,, 25th ,,
282	.....	m	,, 7th ,,
283	.....	m	
284	.....	m	
285	December 11th ...	f	June 23rd ,,
286	.....	m	
287	.....	m	
288	December 12th ...	m	May 8th ,,
289	.....	m	
290	.....	m	
291	.....	m	
292	.....	f	,, 7th ,,
293	...	m	
294	December 13th ...	f	
295	.....	m	,, 7th ,,
296	.....	f	(Berried).
297	.....	m	
298	.....	m	May 8th ,,
299	.....	m	
300	.....	m	,, 21st ,,

Table IX. Continued.—Migrations of Lobsters.

SEA HOUSES, 1907-8.

Number.	Date.	Size.	Sex.	Date and Place of Recapture.
	1907.	Inches.		
501	November 13th ..	10	m	
502	.....	8	f	
503	November 16th ...	$8\frac{3}{4}$	m	
504	,, 19th ...	$10\frac{1}{2}$	f	April 11th, 1908, same place as first caught, travelling about 1 mile from place of liberation.
505	,, 20th ...	$10\frac{1}{4}$	m	
506	.....	$10\frac{1}{4}$	f	Just prior to May 23rd, 1908, at Sea Houses, on which day it was received at Billingsgate, said $10\frac{1}{2}$ inches.
507	November 28th ...	9	m	
508	.. ...	$9\frac{1}{4}$	m	
509	... ..	9	m	
510	.....	9	m	
	1908.			
511	January 16th ...	$8\frac{3}{4}$	m	
512	.....	$8\frac{3}{4}$	m	
513	January 17th ...	9	f	
514	.....	9	m	
515	.....	$8\frac{3}{4}$	m	
516	January 20th ...	9	m	
517	,, 21st ...	$8\frac{1}{2}$	f	May 21st, 1908, in 2 fths., $1\frac{1}{4}$ miles N. said 9 inches.
518	... ..	8	m	
519	January 24th ...	9	m	
520	.....	9	m	
521	February 8th ...	$8\frac{1}{2}$	m	
522	.....	$8\frac{1}{2}$	m	
523	February 12th ...	8	m	
524	.....	8	m	
525	.....	8	f	
526	February 14th ...	$8\frac{3}{4}$	m	
527	,, 15th ..	$8\frac{1}{2}$	m	
528	,, 14th ...	$8\frac{1}{2}$	f	
529	,, 15th ...	$8\frac{3}{4}$	m	
530	...	9	m	
*531	.....	...		
532	February 18th ...	9	m	
533	.....	9	m	
534	.....	$8\frac{1}{2}$	m	
535	February 20th ...	$9\frac{1}{4}$	m	
536	.....	$9\frac{1}{4}$	m	
537	March 13th ...	9	m	
538	.....	9	m	
539	... ..	$9\frac{3}{4}$	f	

* Not used.

At Beadnell 100 lobsters were marked between October 10th and December 13th, 1907, and 36 were recaptured near to Beadnell up to June 1908. There were 38 marked at Sea Houses from November 13th, 1907, to March 10th, 1908, and of these 3 were recaptured in April and May, 1908.

The Beadnell experiment is especially important as indicating the intensity of the lobster fishing on the Northumberland Coast.

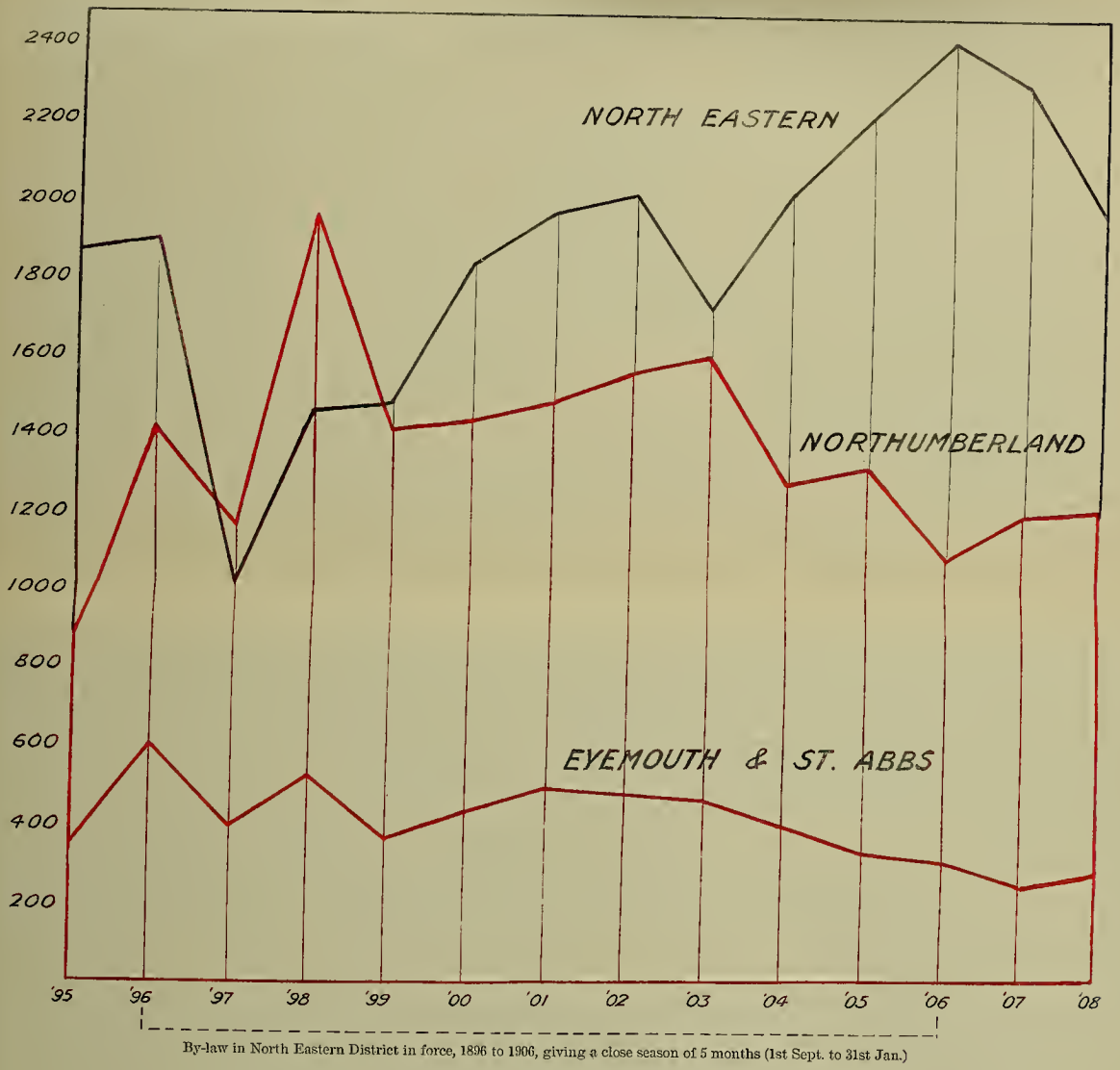
There is no record yet of a lobster having migrated from the region where it was caught and liberated.

A PROPOSED CLOSE SEASON FOR CRABS.

In the report for 1904 a diagram and figures were given which showed that during the months October to December, some 70 to 80 per cent. of the crabs caught in the district were in a soft or white condition. At the time statistics for six years were available, contributed by two fishermen, John Douglas and George Fawcus. Since the publication of the report they have been confirmed by returns of a similar nature.

It is during these months, therefore, that the vast majority of the crabs are in an unsaleable condition from either actually being soft or being in the process of becoming hard, when they are known as white crabs. The condition is rapidly recovered from towards the end of the year and the beginning of January, and up to September very few soft crabs are met with. During that month the onset of the annual casting season is once more evidenced by the increasing number of soft crabs caught by the fishermen. In September and October at least, as has been evident from the trawling experiments for a number of years, the soft crabs are found to a large extent on soft ground. This was known to Mr. Fawcus, for he wrote with reference to the large number of soft crabs caught by him in 1905 (*v.* Report for 1905, p. 87), "if all the crab pots had been on the smooth bottom I could have doubled the number of white crabs. I counted 28 white crabs in one crab pot on the smooth bottom."

A comparison was made at the same time of the statistics furnished by the Board of Agriculture and Fisheries for the Northumberland and the two adjoining districts. The North-Eastern Committee (to the south) passed in 1896 a by-law giving a close time from September 1st to January 31st each year, thus including the months in question. This by-law remained in force until 1906, when it was repealed. During this period of ten years in the Northumberland district, where the crabs have not been protected, the autumn and winter fishing has, especially in the northern half of the area, been prosecuted with increasing energy from season to season. It cannot be said to what extent this is true for the Eyemouth district (to the north), but Williamson's results for Dunbar at all events show that the casting season is practically identical with that of Northumberland. The Eyemouth district is also unprotected by a close time.



N.B.—Figures on left of diagram represent "thousands of crabs."

CHART II.

The result of the comparison made in 1904 was to demonstrate that the district where a close time was in force was the only one of the three which could be said to have improved. The others had distinctly fallen away during the same period. It must be remembered that from 1896 to 1906, the fishermen of the North Eastern district could fish only during 7 months of each year, whereas the fishermen in the other districts, and certainly in the Northumberland region with increasing strength, for the whole year. In spite of the fact that the fishing was thus confined to a part of the year the number of crabs caught in the North-Eastern area rose practically without interruption during the period.

As the point is an interesting one, I venture to bring the figures up to date and to depict the results once more in graphic form.

Year.	North-Eastern.	Northumberland.	Eyemouth.
1905 ...	2,222,819 ...	1,342,144 ...	326,100
1906 ...	2,420,637 ...	1,163,988 ...	313,000
1907 ..	2,329,871 ...	1,200,823 ...	245,500
1908 ...	1,935,816 ...	1,211,362 ...	386,200

It ought to be stated that the figures for 1907 and 1908 for Northumberland include collections from three ports not previously collected from, and one of these a fairly important crabbing station.

During the three months in question soft crabs enter the crab pots in large numbers. These are not brought ashore, and such evidence as has been available has shown that there is a great liability to destruction of the soft crabs in removing them from the creels. Not only so, but there is the added danger of the fishermen sending material to the market unfit for food, however carefully he may select, and which will therefore have a tendency to disgust the consumer.

The letters which fishermen receive during the period illustrate this. Here is a quotation from one from an important midland market dated November 11th, 1908. "As wired you yesterday, we had one of your barrels of crabs returned to us; we got three dozen out of it that were at all saleable, and the man who bought your other one said that his was best part useless." A week later (November 17th) the same fisherman got a letter and certificate intimating that sixty-eight of his crabs had been condemned in the fish market "as unfit for the food of man." Fishermen themselves realise that during these three months the crab is out of season, and prices are at their lowest ebb. The evidence shows as strongly as it is possible to conceive that nature is calling out for a close time at that period.

The investigations which have been made on the Northumberland coast have indicated this and the period when it should be given. The migration experiments explain also why it is that a protected area will improve. It has been proved by the experiments that the main population of crabs is a stationary one, migrating only outwards and inwards and only to a limited extent along the coast ; the females which have recently cast and are soon to become berried lobsters alone migrating to the north. It is only to a slight extent therefore that a district will gain from the protection in the district to the south by the migration of a number of the female crabs.

The trend of the facts in a few words is that the fishermen will, by refraining from fishing during the months October to December inclusive, catch during the remaining nine months of the year more crabs and obtain better prices for them than if they were to fish for the whole year.

During these months then the only thing the fishermen can do, if crabbing is to cease, is to fish with lines for codling and such other species as come inshore at that period. In years prior to the time when winter crabbing was introduced this was the custom, and even now it can be made to give fair returns. It is admittedly easier to bait lines for crab-bait or to buy crab-bait and use the creels. But it is not the policy which in light of the facts set forth can be recommended. The very fact that there is this temptation to adopt the easier method of fishing, points clearly to the advisability of passing a by-law prohibiting the landing and sale of crabs in the district during the last three months of the year.

THE COLLECTION OF STATISTICS IN NORTHUMBERLAND.

It is known to the members of the Northumberland Sea Fisheries Committee that arrangements were made to collect statistics from three new stations, all in the southern division of the Committee's district—Alnmouth, Amble and Cresswell.

It was found, however, when the arrangements were completed that the Board could not pay the Collectors, and the Committee determined for a time to pay them so as to obtain complete statistics for the Northumberland area, and it was hoped that in the meantime the Board would find it possible to add these stations to their list. The collection was begun in 1906, and has been continued until now, when after repeated applications to the Board, the Committee have decided not to continue what is after all a national duty.

The accompanying table will therefore at the present time be interesting as it shows the landings for 1908 at these and the other villages in the southern division of Northumberland, and to what extent local statistics will lose if the collection comes to an end. The very fact that complete statistics cannot be obtained for Northumberland shows that the statistical information with regard to the smaller stations collected by the Board is still far from being complete. However unimportant such small stations are from the point of view of the total landings for the country, they are of importance when matters of local administration are under consideration.

TABLE X.

The landings of all classes of Fish at the stations of the Southern half of the Northumberland District during 1908.

Stations.	Demersal Fish.		Salmon and Trout.		Herring.		Mackerel.		Total Wet Fish.		Crabs.		Lobsters.		Total Value of Fish for Year.
	Cwts.	£	Cwts.	£	Cwts.	£	Cwts.	£	Cwts.	£	No.	£	No.	£	£
Boulmer ...	483	238	99	594	...	...	...	...	582	832	72,673	373	4,905	183	1,388
Alnmouth ...	172	112	91	541	...	...	...	...	263	653	180	2	242	14	669
Amble ...	204	122	266	1,633	...	...	...	...	470	1,755	17,500	111	1,023	45	1,911
Hauxley ...	141	87	193	1,213	...	...	...	...	334	1,300	26,360	190	7,914	289	1,779
Cresswell ...	184	107	18	100	...	...	...	...	202	207	33,450	237	3,550	160	604
Newbiggin ...	3,937	2,191	60	109	492	149	7	5	4,498	2,454	62,120	392	1,731	86	2,932
Blyth ...	265	82	34	188	11,848	2,576	...	...	12,147	2,846	14,620	66	893	39	2,951
Cullercoats ...	1,304	956	403	3,063	...	...	58	86	1,765	4,105	172,056	1,191	4,739	228	5,524

THE FOOD AND CONDITION OF FISH OBTAINED FROM THE NORTH-EAST COAST.

By A. M. CARR, B.Sc.

Table I.—For the purpose of the first part of this paper, which deals with the food of Common Dabs, Long Rough Dabs, Cod, Whiting, Haddock, Gurnards and Starry Rays, the fish were (with the exception of a small number obtained from the Cullercoats boats) sent from Shields market during the months October 1908 to May 1909.

In many cases the localities were stated, and they are summarised under each fish.

As illustrated in the first table, the Dab divides its attentions fairly equally amongst representatives of four groups, viz.: Molluscs, Crustaceans, Echinoderms and worms. The Dabs examined for my paper of last year also contained only these groups, except in one case when the food was fish.

The *Long Rough Dab* shews a marked preference for Crustacean food, as is also the case with the Cod, Ray, Haddock, Gurnard and Whiting; the Whiting, however, has also a liking for fish, especially of its own kind, and in the Gurnard, fish is also present largely.

Table II.—(Dealing with the food and condition of fishes). The fish used were obtained from Shields and Cullercoats over the period of November, 1907 to May, 1909.

The numbers are not sufficiently large to give very accurate results, but the points upon which the work gives some evidence are:—

1.—Common Dab—

(i.) The large proportion of females.

(ii.) The fact that during the summer and early part of the winter the percentage of empty fish was lower than during the rest of the year, say December to April.

2.—Long Rough Dab—

(i.) The very large proportion of females.

(ii.) Again during the summer and early winter months the percentage of empty fish was lower than during the rest of the year, especially the months of January and February.

3.—Whiting—

(i.) The large proportion of males.

(ii.) The fact that in the summer the percentage of empty fish is very low and remains low until quite late in the winter; February, March and April being the only months in which the percentage of empty fish is high.

4.—Starry Ray—

(i.) The percentage here of empty fish is very low throughout the spring, summer and early winter months, and never, even in the remaining months of January, February and March, does it rise to fifty.

There are interesting evidences of the predominance of different classes of foods at successive seasons of the year, which a prolonged examination in this same direction would serve to indicate more fully.

Professor Meek's kindness and his interest in the work have again been a great help to me, and I also thank him for identifying especially the Crustacean and other foods. I would thank, too, Miss Lebour and Mr. Storrow for identifying Mollusca, and Dr. Gelderd for identifying several Schizopods.

TABLE I.—FOOD.

Common Dab, *Pleuronectes limanda*, Linn.

370 fish examined; length from 13·8 to 28·5 cm.

The localities from which about 50 per cent. of these fish were taken are known. They have a southern limit of Middlesbrough and a northern limit of Boulmer; depths from 25 to 40 fathoms. It is probable that the remainder came from much the same grounds.

56 contained Crustaceans:	13	contained	Eupagurus.
	6	,,	*Eupagurus bernhardus.*
	1	,,	*Portunus marmoreus.*
	2	,,	Portunus.
	3	,,	Brachyura, not recognised.
	1	,,	*Hyas araneus.*
	1	,,	*Crangon vulgaris.*
	1	,,	*Crangon spinosus.*
	12	,,	*Paratylus swammerdami.*
	1	,,	*Haploops tubicola.*
	1	,,	*Idotea balthica.*
	1	,,	*Photis longicaudata.*
	1	,,	Amphipods, not recognised.
	1	,,	Crustacean eggs.
	18	,,	unrecognisable Crustaceans.
60 contained Molluscs:	23	contained	*Solen pellucida.*
	10	,,	*Syndosmya prismatica.*
	9	,,	*Pecten opercularis.*
	5	,,	*Pecten tigrinus.*
	2	,,	*Cardium echinatum.*
	2	,,	*Cardium edule.*
	1	,,	Cardium sp.
	2	,,	*Bulla elegans*
	2	,,	*Tellina donacina.*
	1	,,	*Donax vittatus.*
	1	,,	*Leda minuta.*
	1	,,	Rissoa.
	1	,,	Solen.
	1	,,	Nudibranch.
	8	,,	unrecognisable Mollusca.
56 contained Echinoderms:	3	contained	*Ophiura albida.*
	49	,,	Ophiuroids (not verified).
	5	,,	Echinoids.
35 contained worms:	10	contained	*Lineus marinus.*
	5	,,	Nemerteans (unrecognisable).
	5	,,	Nereids ,,
	20	,,	Annelids ,,

9 contained unrecognisable food.

196 were empty.

Long Rough Dab, *Hippoglossus limandioides*, Bloch.

60 fish examined; length from 11 to 27·7 cms.

The localities from which 21 per cent. only of the fish were taken are known. They have a southern limit of Souter and a northern of Coquet Island; depths 28 to 36 fathoms.

14 contained Crustaceans:	3	contained	*Crangon vulgaris.*
	1	,,	*Eupagurus pridcauxii.*
	2	,,	Eupagurus.
	1	,,	Brachyura.
	1	,,	*Leptomysis lingvura.*
	6	,,	unrecognisable Crustaceans.
3 contained Molluscs:	3	contained	*Syndosmya prismatica.*
5 contained Echinoderms:	5	,,	Ophiuriods.
2 contained Fish:	2	,,	Fish, unrecognisable.
2 contained Worms:	2	,,	Polychaets.
2 contained unrecognisable food.			
34 were empty.			

Cod, *Gadus morrhua*, Linn.

58 fish examined; length 19·1 to 37 cms.

Forty of these fish were caught between Seaham and the Longstone, at depths of from 11 to 40 fathoms, the remainder were brought in by the Cullercoats boats, and contained *Pandalus annulicornis* very largely.

48 contained Crustaceans:	20	contained	*Crangon vulgaris*
	15	,,	*Pandalus annulicornis.*
	2	,,	*Eupagurus bernhardus.*
	7	,,	unrecognisable Eupagurus.
	10	,,	,, Brachyura.
	2	,,	*Portunus marmoreus.*
	1	,,	*Portunus pusillus.*
	3	,,	*Galathea nexa.*
	1	,,	Galathea.
	1	,,	*Hyas coarctatus.*
	1	,,	*Spirontocaris spinus.*
	1	,,	*Hippolyte varians.*
	1	,,	*Diastylis goodsirii*
	1	,,	*Schistomysis ornata.*
	19	,,	unrecognisable Crustaceans.
6 contained Worms:	2	contained	Polychaets (unidentified).
	1	,,	Nereid Polychaet.
	3	,,	Aphrodite.

6 contained Fish :	1 contained	*Ammodytes tobianus.*
	5 ,,	unrecognisable fish.
1 contained Molluscs :	1 contained	Sepia.

12 were empty.

Pieces of stone and coal were found in five of these fishes.

Whiting, *Gadus merlangus*, Linn.

182 fish examined ; length from 20·5 to 31·5 cms.

The localities from which about 80 per cent. of these fish were taken are known. They have a southern limit of Middlesbrough and a northern of the Longstone ; depths 25 to 40 fathoms. It is probable that the remainder came from much the same grounds.

42 contained Crustaceans :	10 contained	*Nyctiphanes couchii.*
	7 ,,	*Crangon vulgaris.*
	3 ,,	*Pandalus annulicornis.*
	2 ,,	*Euthemisto compressa.*
	1 ,,	*Carcinus mœnas.*
	20 ,,	unrecognisable fish.
28 contained Fish :	8 contained	*Gadus merlangus*
	2 ,,	*Clupea harengus.*
	1 ,,	*Gadus morrhua.*
	1 ,,	*Ammodytes lanceolatus.*
	1 ,,	*Ammodytes tobianus.*
	16 ,,	unrecognisable fish.
8 contained Molluscs :	6 contained	Sepia.
	2 ,,	unrecognisable Cephalopods.
4 contained Annelids :	1 contained	Aphrodite.
	3 ,,	unrecognisable Annelids.

93 were empty.

Haddock, *Gadus aeglefinus*, Linn.

25 fish examined ; length from 17·3 to 32·5 cms.

7 contained Crustaceans :	1 contained	*Ampelisca macrocephala.*
	1 ,,	*Metopa alderi.*
	1 ,,	*Proto pedata.*
	1 ,,	*Photis longicaudata*
	1 ,,	*Crangon vulgaris.*
	1 ,,	*Portunus marmoreus.*
	1 ,,	*Eupagurus bernhardus.*
	1 ,,	Brachyura.
	1 ,,	unrecognisable Crustaceans.
10 contained Echinoderms :	8 contained	Ophiuroids.
	2 ,,	*Echinocyamus pusillus.*

8 contained Annelids.

Grey Gurnard, *Trigla gurnardus*, Linn.

150 fish examined; length 15·8 to 38·5 cms.

126 contained Crustaceans:	95	contained *Schistomysis spiritus.*
	8	,, *Crangon vulgaris.*
	1	,, *Pandalus annulicornis.*
	5	,, unrecognisable Brachyura.
	17	,, unrecognisable Crustaceans.
10 contained Fish:	7	contained *Ammodytes tobianus.*
	3	contained unrecognisable fish.
2 contained Annelids.		
1 contained Molluscs:	1	contained Sepia.
1 contained Echinoderms.		
27 were empty.		

Starry Ray, *Raia radiata*, Donov.

9 fish examined; length 29·5 to 41 cms., breadth 20 to 28 cms.

These fish, with the exception of those containing fish and nereids, were caught off St. Mary's or Blyth.

7 contained Crustaceans:	1	contained *Ampelisca macrocephala.*
	3	,, *Crangon vulgaris.*
	1	,, *Hippomedon denticulatus.*
	1	,, *Halimedom mülleri.*
	1	,, *Ampelisca odontoplax.*
	2	,, Eupagurus.
	1	,, unrecognisable Crustaceans.
4 contained Annelids:	2	,, Nereids.
	2	,, unrecognisable Annelids.
1 contained Fish.		
1 was empty.		

TABLE II.—THE FOOD AND CONDITION OF FISH IN EACH MONTH.

COMMON DAB.

Condition.	January.	February.	March.	April.	May.	June.	October.	November.	December.
ber of fish examined	22	62	141	51	36	16	21	54	4
ntage of mature or nearly nature females	63·6	29	52·4	74·5	69·4	62·5	...	...	...
ntage of mature or nearly nature males	31·8	41·9	39	13·7	16·6	...	...	1·8	...
ntage of immature females ..	...	24·1	6·3	7·8	11·1	31·2	?	70·3	75
,, males ...	4·5	4·8	2·1	3·9	2·7	6·2	21–?	24	25
Number of females ...	7	33	3	5	4	15		3	3
Number of males	4	29	2	1	1	1		1	1
e of size in centimetres ...	18 to 27	13·8 to 25	13·7 to 26·2	15·3 to 25·5	14·2 to 27·5	15·5 to 25	16·5 to 25·7	15 to 28·5	14·7 to 24
Food.									
er of fish examined ..	21	65	141	57	61	18	30	55	4
ntage contng. Crustaceans ...	52·3	7·6	6·3	14	24·5	27·7	90	18·1	50
,, Echinoderms ..	...	9·2	10·6	22·8	40·9	...	6·6	14·5	...
,, Molluscs ...	4·7	12·3	13·4	14	9·8	38·8	16·6	12·7	...
,, Worms ...	...	4·6	7·8	14	16·3	27·7	3·3	7·2	...
,, Fish ...	4·7	...	...	...	...	...	...	...	...
,, Unrecognisable food ...	...	4·6	...	...	3·2	...	...	...	...
empty	80·9	69·2	65·9	56·1	31·1	22·2	3·3	49	50

TABLE II. CONTINUED.—LONG ROUGH DAB.

CONDITION.	January.	February.	March.	April.	May.	June.	October.	November.	December.
mber of fish examined	13	27	17	13	34	22	13	24	17
centage of mature or nearly mature females	84·6	59·2	23·5	23	2·9	...	92·3	62·5	70·5
centage of mature or nearly mature males	...	3·7	...	...	...	..	7·6	12·5	...
centage of immature females...	15·3	18·5	76·4	76·9	88·2	100	...	25	23·5
,, ,, males ..	...	18·5	...	...	8·8	...	...	...	5·8
Number of females / Number of males	99·9 / ...	7 / 2	99·9 / ...	99·9 / ...	31 / 3	100 / ...	12 / 1	7 / 1	16 / 1
ge of size in centimetres ...	15 to 28·7	11 to 29·2	16·1 to 23	19·3 to 26	16 to 24·5	17·5 to 26·5	16·2 to 25	18 to 23·7	16·3 to 24·6
FOOD.									
n examined for food	11	28	16	13	45	27	13	22	17
centage contng. Crustaceans ...	...	3·5	31·2	23	48·8	48·1	38·4	63·6	58·8
,, ,, Molluscs ...	27·2	3·5	12·4	...	15·5	51·8	30·7	4·5	11·7
,, ,, Worms ...	...	7·1	6·2	...	11·1	...	...	...	11·7
,, ,, Echinoderms ..	...	...	6·2	...	...	7·4	7·6	9	...
,, ,, Unrecognisable food ...	...	...	...	7·6	2·2	...	...	...	...
,, ,, Fish	...	14·2	...	...	2·2	7·4	...	9	...
,, empty	72·7	75	43·7	69	31·1				

Condition.	January.	February.	March.	April.	May.	June.	October.	November.	December.
ıber of fish examined	26	38	95	52	34	6	7	38	14
entage of mature or nearly mature females	23	18·4	33·6	50	55·8	33·3	...	...	...
entage of mature or nearly mature males	38·4	15·7	23·1	34·6	17·4	66·6	85·7	...	...
entage of immature females ...	19·2	23·6	11·5	1·9	5·8	...	14·2	47·2	35·7
,, ,, males ...	19·2	42·1	31·5	13·4	20·5	...	...	52·6	64·2
Number of females / Number of males	11 / 15	8 / 11	43 / 52	27 / 25	7 / 10	...	...	17 / 20	...
ge of size centimetres... ...	14·5 to 35	20 to 30	20·5 to 33	21 to 32·6	22·5 to 33·5	21·2 to 27·5	22·5 to 27·5	21 to 28·5	23 to 29
Food.									
ber of fish examined for food..	21	32	74	51	43	6	7	21	25
entage contng. Crustaceans ...	...	15	21·1	27·4	27·9	...	100	55·2	76
,, ,, Fish ...	76	12·5	21·5	13·7	23·2	...	...	...	...
,, ,, Worms ...	4·7	6·2	1·3	3·6	9·3	...	...	13	...
,, ,, Molluses ...	4·7	12·5	...	...	2·3	100	...	5·2	...
,, ,, Unrecognisable food ...	...	...	...	3·9	6·9	...	...	...	...
, empty	14	71·8	70·2	56·8	39	...	...	28·5	20

TABLE II. CONTINUED.—STARRY RAY.

CONDITION.	January.	February.	March.	April.	May.	June.	October.	November.	December.
nber of fish examined... ...	7	47	26	2	...	6	22	5	2
centage of mature or nearly mature females	42·8	34	26·8	...	...	50	...	...	...
centage of mature or nearly mature males	42·8	29·7	30·7	...	...	16·6	...	...	...
centage of immature females...	...	21·2	11·5	50	...	16·6	36·3	...	...
,, ,, males ..	14·2	14·8	30·7	50	...	16·6	63·6	100	100
Number of females	3	26	5	1	...	2	4	...	...
Number of males	4	21	8	1		1	7		
ge of size in centimetres ...	28 to 41	30 to 43·4	30·5 to 41	29·5 to 37·5	...	33 to 50	35 to 45	29·3 to 34	32 to 41
FOOD.									
nber of fish examined for food..	7	43	25	2		15	22	6	3
centage contng. Crustaceans ...	28·5	18·6	48	100	...	80	95·4	83·3	66·6
,, ,, Fish	14·2	18·6	...	50	...	20	13·6	...	...
,, ,, Worms ...	14·2	...	8	50	...	...	9	16·6	33·3
,, ,, Molluscs ...	...	13·9	8	...		6·6	...	...	...
,, ,, Unrecognisable food ...	28·5	4·6	8		...	...	...	...	...
,, empty	14·2	48·8	40	...	..	13·3	...	...	...

AGE DETERMINATIONS IN THE COMMON DAB, LONG ROUGH DAB AND WHITING.

By A. M. CARR, B.Sc.

The fish used for these determinations are the same as those used in the former paper, though only in the case of the dab, long rough dab, and whiting was there material to indicate the mean size at a given age. In the dab and the long rough dab the age has been determined by otoliths, and in the whiting by scales.

As is shown in the tables following, the fish were taken for the most part during the winter period of growth, and therefore the results refer mostly to fish completing the year's growth.

In the common dab and long rough dab, when the age is determined by otoliths, it is difficult to say, without a complete range from the youngest fish, exactly what part, in the centre of the otolith stands for the first and second years.

In the whiting in which the scales were used, there is not this same difficulty in the youngest stages.

Below is a comparison of the sizes in some of the year groups obtained by this and the Petersen method (Prof. Meek in the Northumberland Sea Fisheries Report, 1905, and Dr. Fulton in the Report of the Fishery Board for Scotland, 1905).

COMMON DAB.

	Reports Compared.	Age estimated.	Date when taken.	Mean Size.
3	Dr. Fulton in Report of Fishery Board for Scotland, 1905	Approaching 3 yrs.	January ..	14·5—15·5 cms.
	Present paper	3 years	March ...	16 cms.
	Prof. Meek in Northd. Sea Fisheries Com. Report, 1905	3 years	June ...	18·5 cms.
4	Prof. Meek in Northd. Sea Fisheries Com. Report, 1905	4 years	June ...	23·5 cms.
	Present paper	4 years	March ...	females, 20 cms. males, 19 cms.
5	Prof. Meek in Northd. Sea Fisheries Com. Report, 1905	5 years	June ...	27·5 cms.
	Present paper	5 years	March ...	females, 23—24 c. males, 22 cms.

LONG ROUGH DAB.

3	Dr. Fulton in Report of Fishery Board for Scotland, 1905	3 years	April ...	females, 13—21 c. males, 11—15 cms.
	Present paper	3 years	March ...	males and femal 16 cms.

WHITING.

2	Dr. Fulton in the Fishery Board for Scotland's Report, 1905	Approaching 2 yrs.	April ...	22 and 28 cms.
		,, ,,	April ...	22 and 26 cms.
	Present paper	,, 2 yrs.	March ...	24 cms.

COMMON DABS, MALES.

Age. Date.	2½ Years. September.	3 Years. March.	3½ Years. September.	4 Years. March.	4½ Years. September	5 Years. March.	5½ Years. September.
12 cms.	...	1	...	...	...	...	...
13 ,,	...	...	...	...	...	...	...
14 ,,	1	5	1	1	...	...	...
15 ,,	...	5	1	5	...	...	...
16 ,,	...	11	1	7	...	...	...
17 ,,	...	8	...	10	...	...	...
18 ,,	...	9	1	14	...	...	...
19 ,,	...	2	...	21	...	...	...
20 ,,	...	3	...	10	1	1	...
21 ,,	...	3	...	7	1	...	...
22 ,,	...	2	1	3	...	4	...
23 ,,	...	1	...	3	...	2	...
24 ,,	...	1	...	...	...	...	...
25 ,,	...	1	...	...	...	...	...
26 ,,	...	...	...	...	...	...	...
27 ,,	...	...	...	...	...	...	...
28 ,,	...	...	...	...	...	...	...

COMMON DABS, FEMALES.

·.).	2½ Years. September.	3 Years. March.	3½ Years. September.	4 Years. March.	4½ Years. September.	5 Years. March.	5½ Years. September	6 Years. March.
s.	1	1	...	...	...	...	...	...
	...	3	...	...	...	...	...	...
	...	4	...	...	...	...	...	...
	...	9	1	3	...	...	...	...
	1	11	2	2	...	...	...	...
	...	11	4	16	...	...	...	...
	...	9	2	24	...	...	...	...
	...	8	7	33	...	...	...	...
	...	4	6	37	1	1	...	...
	...	...	2	17	2	3	...	...
	...	3	4	18	...	5	...	...
	...	3	1	7	2	6	...	...
	...	2	...	...	2	6	...	2
	...	1	...	4	1	5	...	3
	...	...	...	...	...	2	..	2
	...	...	...	...	...	1	...	1
	...	...	...	...	...	...	...	...

LONG ROUGH DABS, MALES AND FEMALES.

Age. Date.	1½ Years. September.	3 Years. March.	3½ Years. September.	4 Years. March.	4½ Years. September.	5 Years. March.	5½ Years. September.	6 Y... Ma...
6 cms.	1	...	...	...	...	...	...	
7 ,,	2	...	...	...	...	...	...	
8 ,,	...	...	...	...	...	...	...	
9 ,,	...	...	...	...	..	...	...	
10 ,,	...	...	...	...	...	...	...	
11 ,,	...	1	...	...	...	...	...	
12 ,,	...	...	...	...	...	...	...	
13 ,,	...	...	...	...	...	...	...	
14 ,,	...	1	...	...	...	...	...	
15 ,,	...	...	...	...	...	...	...	
16 ,,	...	3	1	...	...	...	...	
17 ,,	...	2	3	3	...	...	...	
18 ,,	...	1	...	2	...	...	...	
19 ,,	...	1	...	8	1	1	...	
20 ,,	...	...	...	10	3	...	2	
21 ,,	...	1	...	11	3	6	2	
22 ,,	...	1	...	7	6	12	1	
23 ,,	...	1	...	3	...	6	2	
24 ,,	...	...	...	1	1	3	4	
25 ,,	...	...	...	...	...	1	1	
26 ,,	...	...	...	...	...	1	...	
27 ,,	...	...	...	...	...	...	...	
28 ,,	...	...	...	...	...	...	...	

WHITINGS, MALES AND FEMALES.

Age. Date.	1½ Years. September.	2 Years. March.	2½ Years. September.	3 Years. March.	3½ Years. September.	4 Years. March.	4½ Years. September.
20 cms.	1	2	...	...	...	...	...
21 ,,	...	3	...	...	...	...	...
22 ,,	...	3	...	2	...	...	...
23 ,,	...	8	...	...	...	...	...
24 ,,	...	12	...	...	...	...	...
25 ,,	...	9	1	4	...	...	...
26 ,,	...	8	...	2	...	...	...
27 ,,	...	3	...	7	...	2	...
28 ,,	...	5	...	3	...	3	...
29 ,,	...	5	...	5	1	...	...
30 ,,	...	...	...	2	1	1	1
31 ,,	...	...	...	...	1	2	...
32 ,,	...	1	...	1	2	1	...
33 ,,	...	1	...	1	...	...	.

THE MARINE LABORATORY.

In this report a photograph of the new laboratory is given, and plans of the two main floors.

The laboratory occupies the site in Cullercoats harbour where the old baths building stood for so many years, and where also the first laboratory was situated. To ensure the site and the building being adequately protected, the quay was surrounded by a concrete wall built on the Hennibique system, and either resting on, or connected to, the rock by concrete piles. The foundations of the laboratory and tanks were also made of re-inforced concrete. The superstructure is of red brick relieved with sandstone. The roof is flat, and on the roof is a tank for storing the salt water for the laboratory taps, and projecting above it is a small third storey which provides lavatory accommodation, and also gives entrance to the laboratory by means of a gangway from near the top of the cliff. Behind the building the large storage tanks for the ground floor are placed, raised on concrete pillars, and beneath the tanks is the pump room, and by its side the boiler house. There are two boilers, one for heating the water for the taps of the laboratory, and the other for the radiators. The pump is a centrifugal one, and is driven by an electric motor. The building is lighted throughout by electric lights.

Entrance is gained to the ground floor by doors at the front and back. At the front entrance is a small office, and the hall leads on one side to the public and on the other to the private aquarium. In the former there are eleven tanks around the room, lighted from above, and a floor tank. Access is gained to the side tanks by a gallery reached by a door leading from the first landing of the stair. The water is led to the bottom of the tanks by glass tubes, and drainage takes place at the top into a wide, straight tube in the partition wall. Each of these discharges into an open, deep and wide drain beneath the tanks. The tanks can also be sludged into this drain, which, when required may be made to discharge its contents outside the building. The floor tank occupies a large share of the floor space. It receives two supplies, one from the drain under the tanks just mentioned, and the other from a fountain. The floor tank discharges outside the building by way of a deep open channel in the floor. One advantage of the

DOVE MARINE LABORATORY, CULLERCOATS.

system is that even small inhabitants of the tanks may be screened so as to prevent them escaping, and if screens be not put in, and they escape into the open drain, they may be easily recaptured and restored. Another is that there are no drainage pipes within the building liable to be choked up.

The private aquarium possesess 38 small tanks and a concrete table, both supplied with salt water. There has since the opening been installed a complete set of paddles in the tanks, worked by a tip-bucket; and two of the tanks from the old laboratory have been used in connexion therewith to form an experimental hatching apparatus, the fry being led by a trough to any of the six series of shallow tanks. The additions were made by means of a grant from the Board of Agriculture and Fisheries.

The tanks in the private aquarium may therefore be used for studies in embryology, for experimental hatching and rearing, and for storing material for observation and description. The concrete table is drained next the wall, and is especially meant for experiments in glass vessels, &c. A tank for photography has been placed in a window recess, the window being so made that it can be opened completely.

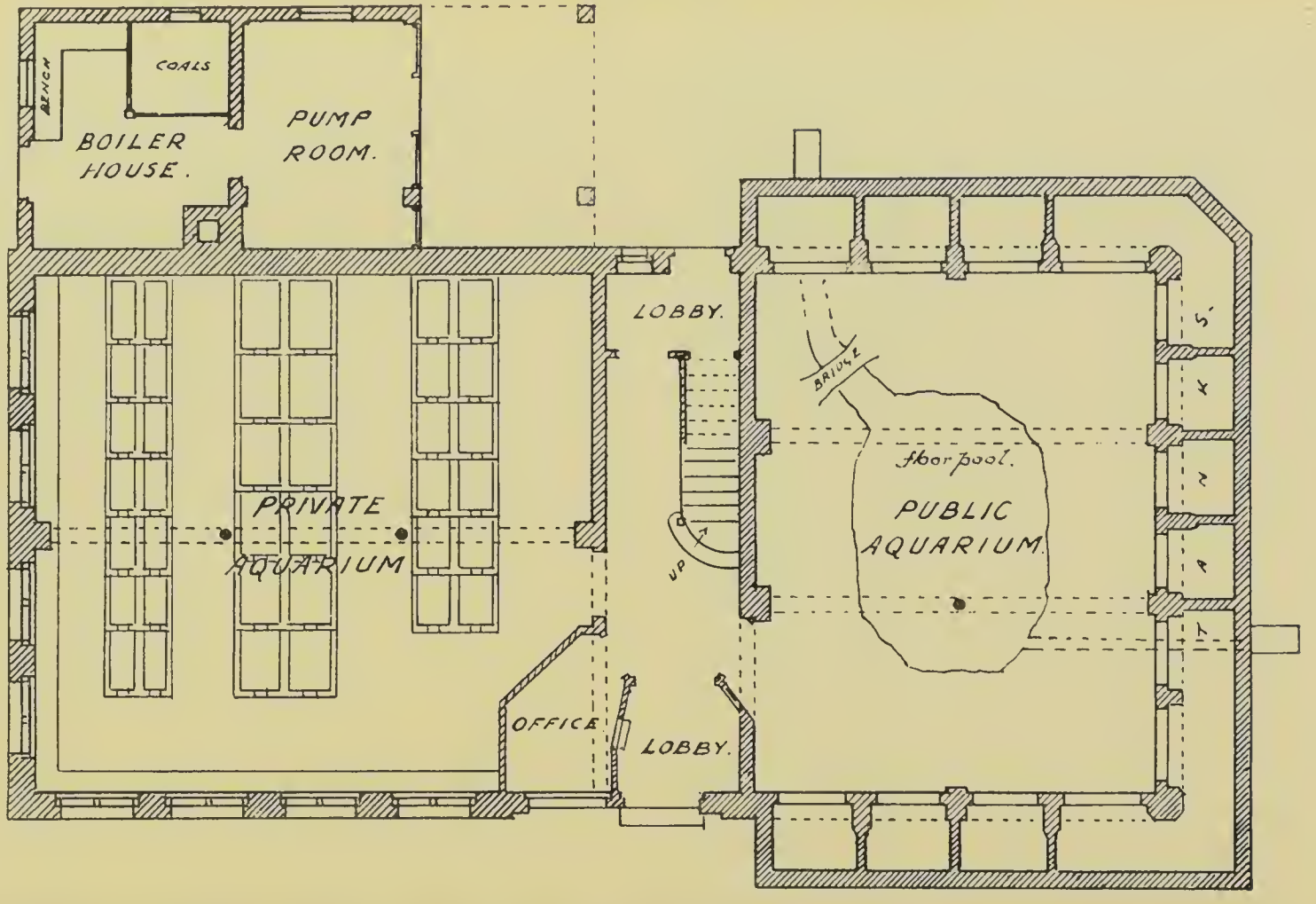
The first floor contains the laboratory, divided as usual by partitions into a series of tables. The tables are made with teak tops, and are fitted with drawers and cupboards, and to each there are also shelves and a sink with hot and cold fresh and salt water. Two of the tables in this room are made into private laboratories, and there is a third private laboratory, opening directly from the landing. The specimen room is also provided with a work table of the same pattern, and it is furnished with shelves and a case and drawers for collections. The library is fitted with shelves, cupboards with glass doors, table and reading desk. A store room for reagents, &c., also opens from the laboratory. This floor also provides a dark room, lecture room, and Director's room.

The building was opened on September 29th by His Grace the Duke of Northumberland, the late Mr. Hudleston being in the chair.

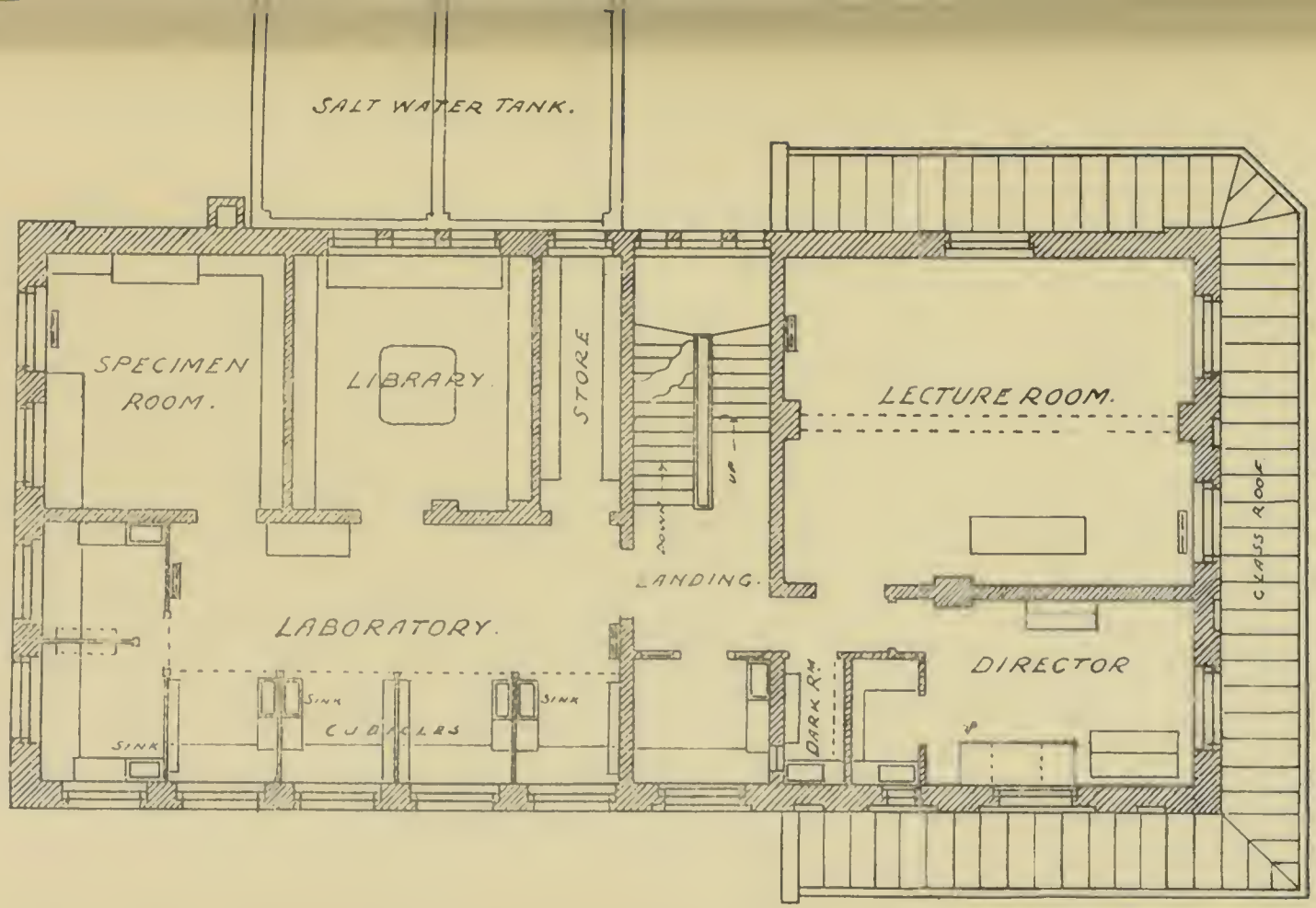
Two tables are supported by Armstrong College, one by the University of Durham, one by the Newcastle Natural History Society, and one by the Northumberland Coast Club. The Coast Club table has been used regularly by several of the members, and already some of these have added materially to the Laboratory's collections. Mr. Sisson occupies the Natural History Society's table, and is devoting himself particularly to a study of the chemistry of the sea. Mr. Howson, Lecturer in Physiology in the College of Medicine, has given some of his time as the occupant of the table of the University to an enquiry into comparative histology. The tables of the College have been occupied by Miss Lebour, who has made a successful experimental infection of the mussel with trematodes (results published in Parasitology, 1909), and in further work on trematodes of fish; by Miss Carr for the continuation of her investigations on the food of fish, and on their condition and growth; by Mr. Brennan for an enquiry into the histological structure of Algae; by Mr. Barling for a study of the destructive work of *Limnoria lignorum* on timber used for piles. Dr. Gelderd, of St. Cuthbert's College, Ushaw, has also made several visits to obtain specimens for continuing his work on the minute anatomy of Mysidae. Material for research has been sent to Professor F. J. Cole, to Sir Charles Eliot, and others.

The library already possesses many important works, and the thanks of the Committee are especially due to the Royal Society and the Government for a practically complete set of the Challenger volumes, to the Government for reports dealing with

DOVE MARINE LABORATORY, CULLERCOATS.



GROUND PLAN.



FIRST FLOOR PLAN.

the international investigations, to Fishery Boards and investigators for reports and papers. A set of the Transactions of the Newcastle Natural History Society was obtained through the College and the Natural History Society.

A motor boat at present being built from special designs prepared by Mr. Alexander, Lecturer in Naval Architecture in Armstrong College, will be presented to the Laboratory by an anonymous donor. It will be a welcome addition to our equipment. The boat will measure 50 feet long, 11 feet beam, and will be furnished with a Gardner engine of 30 H.P.

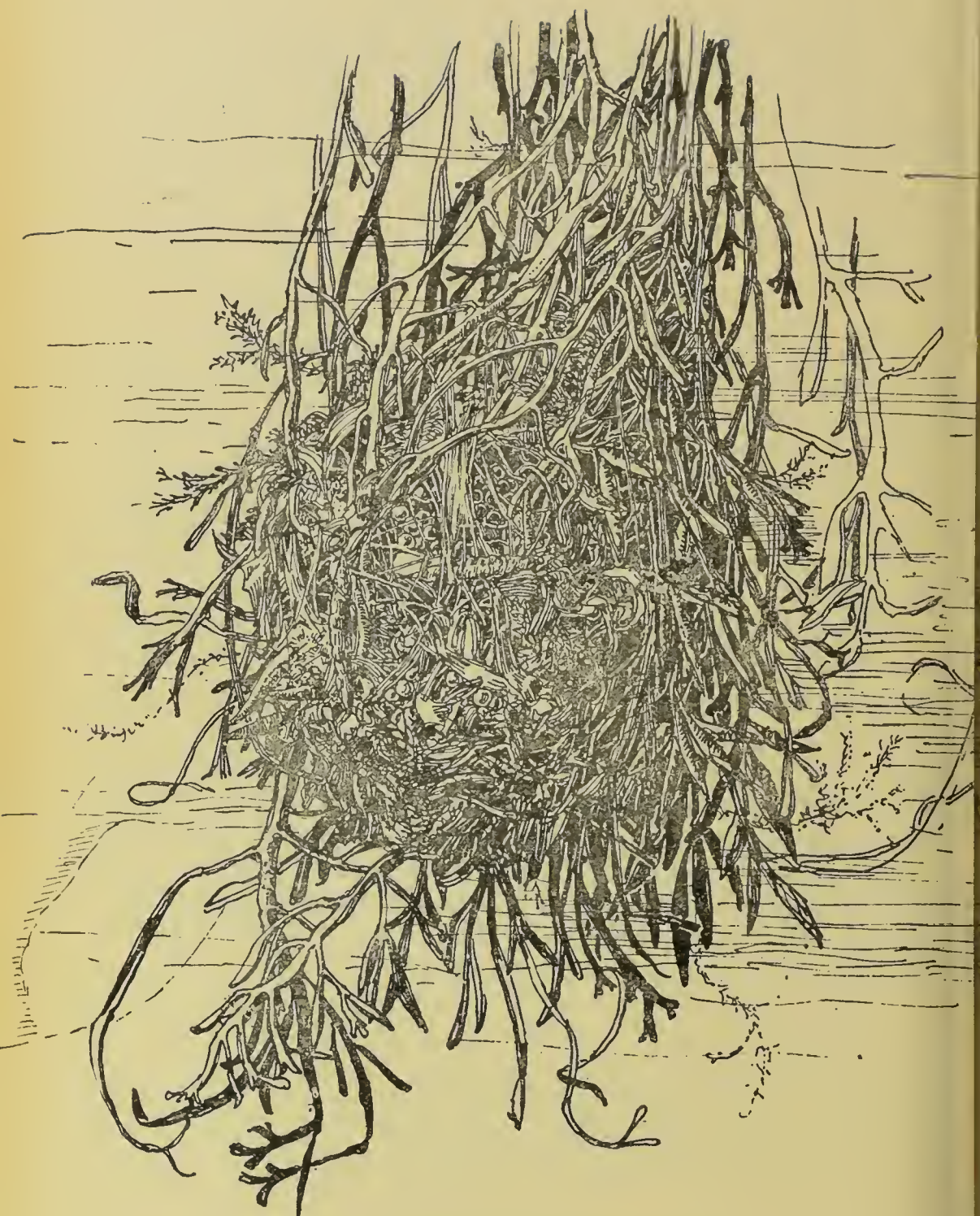
I have pleasure in acknowledging the loyal help of the attendant, John A. Taylor, in the work of the Laboratory. But it is manifest that an institution of this kind, however well equipped, cannot be worked to advantage by a Director, who can only give a share of his time to it, and by an attendant. The general biological work of the Laboratory, on the shore, and in the sea (with the Mysis and the new boat) could be greatly extended by the appointment of a Naturalist. Further help of a manual nature is even more essential. For the development of the Fishery investigations in connexion with a Laboratory so excellently placed with regard to the important fishing grounds of the North Sea, and in close proximity to the fishing port of North Shields, it was felt that the Treasury Committee which sat under the chairmanship of Mr. Tennant would point the way, and show at the same time how the means were to be obtained. But the main purpose of the Committee, which was to have settled the question of Fishery research in England and Wales has been lost sight of in discussions as to the nature of the central control. Thus, up to now, nothing has been done to give effect to the recommendations, or to take the steps, if there are any, to settle the point at issue, before putting the recommendations into force.

PRELIMINARY NOTE ON THE SEA WATER OF THE MARINE LABORATORY.

By G. SISSON.

From the end of April this year the sea water as pumped into the tanks in the aquarium has been analysed at intervals. The temperature has also been recorded. We have thus only about three months record so far. During the time, we have been struck by the remarkable uniformity in the strength of the sea water, although the suction pipe draws from between tide marks in Cullercoats Bay. The strength is indicated by the salinity or saltness, which averages 34·4 per 1000. The lowest figure occurred on June 30th, during a flood from the River Tyne, which extended during ebb almost to the mouth of Cullercoats Bay, the figure on that day being 34 per 1000.

The supply of sea water in the Laboratory thus compares favourably with the general water off the North-East Coast as found by many samples taken off Almmouth Bay, Farne Islands, &c., both at the surface and at twenty to thirty feet depth, the average salinity of such water being 34·45. The general salinity of the North Sea is of course less than that of the North Atlantic, which averages 36.



Nest of Fifteen-Spined Stickleback